Perceptions of cancer risk and self-care practices: comparison of groups at different risk for cancers

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KEY MESSAGES

1. Groups with predisposing risk factors generally perceived themselves to have a higher susceptibility to the cancers to which they were vulnerable, with the exception of female passive smokers.
2. Nonetheless, in predisposed individuals, their perceived higher susceptibility to cancer remains markedly lower than their actual risk derived from current risk projection. Over 60% of smokers, hepatitis B (HBsAg) carriers, and female relatives of breast cancer patients underestimated their risk of cancer relative to that derived from current risk projections.
3. HBsAg carriers and female relatives of breast cancer patients reported a higher optimism score compared with other groups and lived a healthier lifestyle, whereas smokers were more likely to be regular drinkers and consumed less fruit and vegetables.
4. Optimism was positively associated with adopting measures to maintain health

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Introduction

Individuals with cancer-related risk factors are more vulnerable to certain types of cancer compared with those without such factors. Smokers have 20-25 times excess risk of lung cancer compared with never smokers.[1] Individuals who carry the BRCA I genetic mutation have 60-85% lifetime risk of developing breast cancer.[2] Chronic hepatitis B (HBsAg) infection increases the risk of hepatocellular cancer by 223 times.[3] However, people generally tend to underestimate their actual risk (optimistic bias); this may lead to failure to take necessary preventive action. Unmodifiable risks (genetic factors and acquired viral infection) are perceived to be a greater threat than modifiable risks (smoking and meat consumption). Smoking and breast cancer genetic risk are the most prominent cancer risks addressed in contemporary media. This should amplify their perceived riskiness relative to the cancer risk associated with viral infection. Perceived risk affects adoption of protective actions; its effect on behavioural change can be mediated or moderated by cognitive factors such as optimism, worry, and perceived self-efficacy.

This study compared risk perception of cancer between groups with different predisposing factors and its association with cognitive factors (optimism, perceived self-efficacy and worry about cancer) and lifestyle practices.

Methods

This multi-group cross-sectional study was conducted from January 2011 to December 2013 and was approved by the HKU/HIWC institutional review board. Five groups with different predisposing risks for a particular (target) cancer were recruited.

(1) Female first-degree relatives of breast cancer patients (BC-relatives): the relative was diagnosed with breast cancer before age 50 years but not known to be a BRCA polymorphism carrier. Eligible subjects were identified through eligible breast cancer patients who attended for follow-up at local breast centres. All eligible subjects were invited to complete a face-to-face interview.

(2) HBsAg carriers: asymptomatic patients recruited from local specialist clinics. Eligible subjects were referred by the clinic professionals and then approached by the project assistant for face-to-face interview.

(3) Smokers: asymptomatic and currently healthy adult smokers.

(4) Passive smokers: non-smoking adults living with a current smoker.

(5) Healthy adults: asymptomatic and currently healthy adults without the above predisposing factors (a family history of breast cancer, active smoking, living with a smoker, and HBsAg positive).

Smokers, passive smokers, and healthy adults were identified using randomly generated landline

numbers. For selected households, the person of first contact was asked whether any adult smokers were living in the household. If yes, one adult smoker and one adult non-smoker within the household were invited to participate. Otherwise, one adult whose birthday was closest to the survey date was invited.

Similar questionnaires were used for data collection for the five groups. Major outcome measures included:

(1) Perceived cancer risk: respondents were asked about their perceived absolute susceptibility and susceptibility relative to a general person of the same age and gender to each of the six common cancers in Hong Kong (ie breast, oesophageal, lung, liver, colorectal, and nasopharyngeal cancer) over the next 5 years. Scores ranged from 0 (very low) to 10 (very high). Respondents were also asked to estimate the prevalence of these cancers in Hong Kong on a scale of 0 (rarest) to 10 (very common). Respondents were asked to indicate how modifiable different types of cancer risk (genetic, acquired [viral], self-exposure [smoking, meat consumption]) and involuntary exposure (roadside air pollution, second-hand smoking) were on a scale of 0 (fixed, unmodifiable) to 10 (completely modifiable).

(2) Cognitive measures: these measured optimism, cancer-related worry, and perceived self-efficacy. Optimism was assessed using the validated Chinese Life Orientation Test – Revised. Perceived self-efficacy was assessed using the general self-efficacy scale validated in the Chinese population. Cancer-related worry was assessed using the Lerman Breast Cancer Worry Scale for worry about breast cancer for BC-relatives, which was adapted to also measure worry about lung cancer for smokers and passive smokers, and worry about liver cancer for HBsAg carriers.

(3) Lifestyle health practices: respondents' smoking and alcohol consumption behaviours, physical activity, and dietary habits were recorded using a standardised questionnaire. An open-ended question was also included to collect data on any other activities or supplements used by the respondents to improve or maintain their health.

Finally, respondents were asked about their health history, family history of cancer, and socio-demographics.

For data analysis, the actual risk of breast cancer among female respondents was assessed, as was hepatocellular cancer risk among HBsAg carriers and lung cancer risk among smokers and passive smokers, using best available risk prediction algorithms for those cancers. Perceived cancer risk score was converted into a 0-100% scale and categorised as <40% (low risk), 40-60% (moderate risk), or >60 (high risk). Bias in risk perception was the difference between respondents' actual and perceived relative risk: 'realistic' if actual and perceived relative risk was consistent, 'optimistic' if perceived risk was lower than actual risk, and 'pessimistic' if perceived risk was higher than actual risk. Respondents' perceived risk by type of cancer, optimism, perceived self-efficacy, and cancer worry were compared across groups stratified by gender, using the Kruskal-Wallis test for multiple-group comparison or Mann-Whitney *U* test with Bonferroni correction to adjust the type I error for pairwise comparison. Chi-square test was used to test the distribution of categorical variables between groups. Logistic regression was used to examine factors associated with healthy lifestyle practices.

Results

A total of 62 BC-relatives, 150 HBsAg carriers, 160 healthy adults, 151 smokers, and 153 passive smokers were recruited. Seven female respondents from the healthy group met the criteria of BC-relatives and were re-allocated. Seven respondents who were diagnosed with cancer were excluded. Thus, 69 BC-relatives, 150 HBsAg carriers, 149 healthy adults, 150 smokers, and 152 passive smokers were analysed. Generally, most smokers (72.7%) were males while most passive smokers (79.6%) were females. The HBsAg carriers were relatively younger (χ^2=39.03, d_f=8, P<0.001) and more likely to be single (χ^2=17.22, d_f=4, P=0.002). Smokers were more likely to have lower educational achievement (χ^2=16.96, d_f=8, P=0.030). Family income across the five groups was comparable.

Compared with healthy adults' perceived personal susceptibility to a particular cancer, BC-relatives perceived significantly higher personal susceptibility to breast cancer, as did smokers to lung cancer and nasopharyngeal cancer, and HBsAg carriers to liver cancer (Table 1). Male (but not female) passive smokers perceived marginally higher susceptibility to lung cancer (Table 1). HBsAg carriers perceived liver cancer to be more common in Hong Kong than did healthy adults, whereas male (but not female) passive smokers perceived lung cancer and nasopharyngeal cancer to be more common (Table 1). Generally, smoking was perceived to be the most-modifiable risk factor by all groups, except for male smokers, whereas genetic factors were perceived to be the least-modifiable risk factor (Table 1).

There was positive association between perceived personal susceptibility to and perceived prevalence of (1) lung cancer among smokers (χ^2=28.31, d_f=4, P<0.001), (2) liver cancer among HBsAg carriers (χ^2=11.94, d_f=2, P=0.03), and (3) breast cancer among BC-relatives (χ^2=8.63, d_f=2, P=0.013).

The Figure shows the prevalence of risk perception bias across groups for different cancers. Compared with the actual relative risk, over 60% of smokers, HBsAg carriers, and female relatives, and

TABLE. I Comparison of perceived risks by type and cognitive factors across groups

Perceived cancer risk	Healthy adults (n=149)		Smokers (n=150)		Passive smokers (n=152)		Hepatitis B carriers (n=150)		First-degree relatives of breast cancer patients (n=69)	P value for females across groups	P value for males across groups
	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Perceived absolute susceptibility (score, 0-10)											
Breast cancer	3.14	-	3.49	-	2.82	-	2.94	-	4.54‡	<0.001	-
Oesophageal cancer	2.53	1.75	2.95	2.77	2.20	2.33	2.07	1.95	2.47	0.480	0.156
Lung cancer	2.33	2.23	5.22‡	4.48‡	2.99	3.63*	2.53	2.11	2.52	<0.001	<0.001
Liver cancer	2.66	2.35	3.80	3.25	2.33	2.67	4.52‡	4.13‡	2.67	<0.001	0.002
Colon cancer	2.85	2.74	3.07	2.69	2.46	2.73	2.81	2.47	2.78	0.453	0.900
Nasopharyngeal cancer	2.26	2.17	4.27‡	4.08‡	2.56	3.20	2.14	2.35	2.54	0.002	<0.001
Perceived comparative susceptibility (score, 0-10)											
Breast cancer	2.89	-	3.78	-	2.61	-	2.78	-	4.72‡	<0.001	-
Oesophageal cancer	2.54	2.18	3.20	2.61	2.35	2.40	2.17	1.97	2.60	0.258	0.623
Lung cancer	2.46	2.52	4.54‡	4.02‡	3.05	3.47	2.50	2.22	2.87	<0.001	<0.001
Liver cancer	2.96	2.73	3.78	3.10	2.61	3.03	4.50‡	4.09‡	2.91	<0.001	0.027
Colon cancer	2.71	3.02	3.60	2.72	2.51	3.13	2.70	2.52	3.12	0.069	0.546
Nasopharyngeal cancer	2.42	2.46	4.39‡	3.56	2.47	3.40	2.23	2.42	2.68	0.001	0.020
Perceived cancer prevalence (score, 0-10)											
Breast cancer	6.46	-	6.95	-	6.63	-	6.29	-	7.32	0.105	-
Oesophageal cancer	4.57	4.21	4.64	4.37	4.37	4.41	4.80	4.24	4.40	0.610	0.902
Lung cancer	6.37	6.16	7.05	6.01	6.73	7.31‡	6.83	6.43	6.35	0.163	0.047
Liver cancer	5.97	5.81	6.70	5.45	6.15	6.52	7.42‡	6.75‡	6.28	<0.001	<0.001
Colon cancer	5.68	5.46	4.85	4.73	5.23	5.86	6.06	5.48	6.05	0.002	0.044
Nasopharyngeal cancer	5.78	5.33	6.02	5.49	5.48	6.83‡	5.60	5.60	5.88	0.785	0.014
Perceived modifiability of risk types (score, 0-10)											
Exposure to air pollution	4.59	4.45	4.47	4.54	3.64	4.26	3.33‡	3.08‡	3.88	0.086	0.010
Exposure to second-hand smoke	5.10	5.74	5.60	5.13	5.18	4.97	4.48	5.84	5.61	0.178	0.161
Smoking	7.12	7.66	6.57	5.31‡	7.29	7.16	8.16	7.69	7.49	0.132	<0.001
Viral infection	5.06	4.93	4.15	4.79	4.81	4.43	4.40	5.15	5.46	0.047	0.592
Genetic factors	3.19	4.05	3.59	3.95	3.64	2.65	2.94	2.80‡	3.41	0.553	0.023
Meat consumption	5.27	5.22	5.82	5.17	5.59	5.61	6.08	5.74	6.12	0.144	0.386
Cognitive factors (score, 1-4)											
Optimism	2.67	2.63	2.62	2.63	2.71	2.74	2.87‡	2.81‡	2.92‡	<0.001	0.050
Self-efficacy	2.75	2.80	2.82	2.84	2.68	2.93	2.65	2.69	2.71	0.625	0.120
Cancer-related worry†	-	-	1.80	1.90	1.74	1.57	1.89	1.86	1.89	0.297	0.083

* P=0.020 after Bonferroni correction to adjust the type I error

† By risk type: worry about breast cancer for first-degree relatives of breast cancer patients, worry about lung cancer for smokers and passive smokers, and worry about liver cancer for hepatitis B carriers

‡ P<0.01 compared with that of healthy adults using Mann-Whitney *U* test with Bonferroni correction to adjust the type I error

only 27.6% of the passive smokers demonstrated optimistic bias in estimating their risk to the relevant target cancer. Compared with these at-risk groups, only 15.1% of the healthy males and 22.1% of healthy females demonstrated optimistic bias in estimating risk to lung cancer and breast cancer, respectively. Compared with the healthy controls, active smokers (OR=20.35, 95% CI=9.69-42.73) were more likely

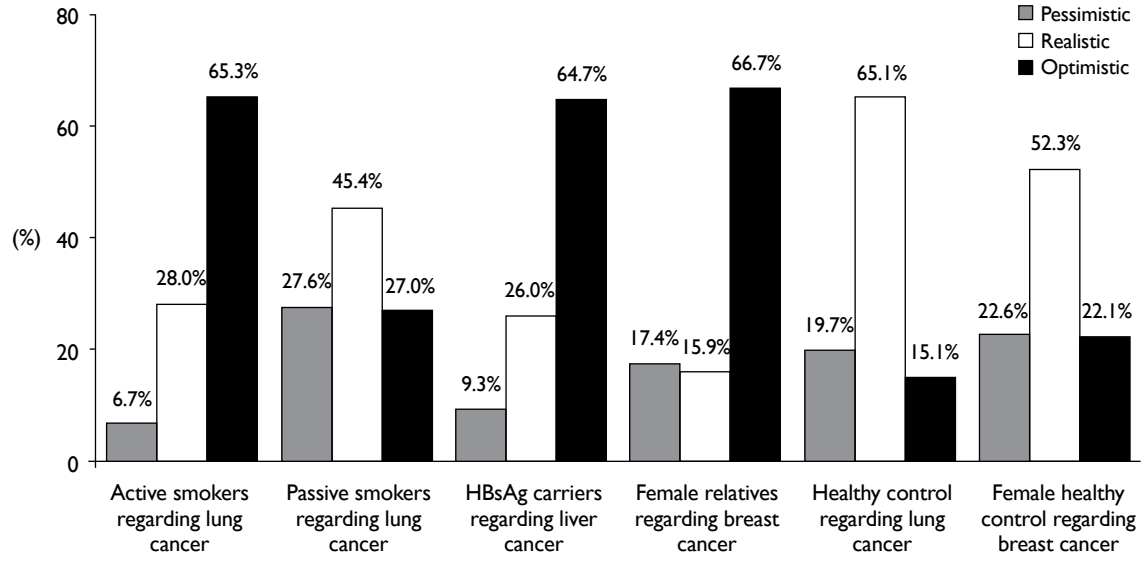

FIG. Bias in risk estimate among first-degree relatives of breast cancer patients, smokers, passive smokers, and hepatitis B (HBsAg) carriers

TABLE 2. Comparison of lifestyle practices across groups

Lifestyle practice	% adjusted for gender differences				
	Healthy adults (n=149)	Smokers (n=150)	Passive smokers (n=152)	Hepatitis B carriers (n=150)	First-degree relatives of breast cancer patients (n=69)
Alcohol consumption					
Never/occasional drinkers	59.2	37.7	56.5	54.4	54.4
Regular drinkers	40.8	62.3*	43.5	45.6	45.6
No. of current smokers	0	150	0	18	6
Physical activity					
Low level	22.8	22.0	19.1	25.2	34.4
Moderate level	42.3	44.7	51.3	42.0	39.3
High level	34.9	33.3	29.6	32.9	26.2
Sitting (hours per day)					
<8	60.2	66.5	66.9	63.3	67.9
≥8	31.8	33.5	33.1	35.7	32.1
Consumption of vegetable and fruit (serving per day)					
<4	62.1	73.5	66.4	50.7	55.6
≥4	37.9	26.5*	33.6	49.3*	44.4
Mean (female:male)	3.43:2.86	2.55:2.76	3.31:2.81	4.16:3.99	3.99
Consumption of red meat					
Never/seldom	16.2	17.3	15.1	23.4	26.1
≤3 times/week	35.8	26.7	26.3	37.9	42.0
≥4 times/week	48.0	56.0	58.6	38.6*	31.9
Any practices adopted to maintain health					
No	41.5	45.7	47.9	31.2	24.4
Yes	58.5	54.3	52.1	68.8	75.6*
Any methods adopted to reduce risk of cancer					
No	86.6	87.3	83.5	86.7	83.8
Yes	14.7	14.4	14.7	14.6	13.2

* P<0.05 compared with the healthy group

to have optimistic bias when estimating their risk to lung cancer after adjusting for gender, age, and educational attainment. Female relatives were more likely to have optimistic bias when estimating their risk to breast cancer (OR=17.95, 95% CI=6.50-49.56).

Compared with healthy adults' cognitive factors, HBsAg carriers and BC-relatives showed higher optimism, but smokers did not show higher optimism than non-smokers (Table 1). Generally, cancer-related worry was low among BC-relatives towards breast cancer, among HBsAg carriers towards liver cancer, and among smokers and passive smokers towards lung cancer (Table 1). There were no group differences in scores of perceived self-efficacy and cancer-related worry.

For lifestyle practices, compared with the healthy group, smokers were more likely to regularly drink alcohol and consume less vegetables and fruit. In contrast, HBsAg carriers consumed more vegetables and fruit per day but less red meat. HBsAg carriers and BC-relatives were also more likely to adopt measures to maintain health (Table 2).

Multivariate logistic regression was conducted to examine the association between perceived risk of cancer and cognitive factors and adoption of health maintenance practices, adjusting for age, gender, educational attainment, and risk group. There was no significant association between perceived risk of cancer and adoption of health maintenance; higher optimism was associated with being more likely to adopt measures to maintain health (OR=1.89, 95% CI=1.20-2.96).

Discussion

Female passive smokers who do not perceive higher personal susceptibility to lung cancer are an important target for health promotion/education. Previous review suggests that more support from partners, especially spouses, can facilitate and maintain smoking cessation.[4] Promoting passive smokers' perceived risk for lung cancer may help smokers to quit smoking. Even among groups who were well aware of their susceptibility to a particular cancer, optimistic bias remained quite prevalent. Although some argued that optimistic bias may be an adaptive process to reduce the anxiety that arises from the greater perceived susceptibility, other studies have suggested it may discourage protective behaviour.[5] Efforts should be made to promote the awareness of these susceptible groups about their objective risk in order to reduce optimistic bias and motivate necessary preventive behaviour. Our study also indicates that an optimistic personality may be associated with more adaptive coping. The role of optimism in coping with risk of cancer should be further explored. This may help develop interventions for high-risk groups, particularly smokers, to reduce their risky lifestyle behaviour.

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