American Journal of Cancer Prevention, 2014, Vol. 2, No. 2, 24-30
Available online at http://pubs.sciepub.com/ajcp/2/2/2

DOI:10.12691/ajcp-2-2-2

Genetic Testing for Risk of Lung Cancer: A Pilot Study Examining Perceived Benefits and Barriers using Health Belief Model

Karishma Desai[1,*], Bupendra Shah[2], Hamid Rahim[2], Hongjun Yin[3], John Lonie[2]

[1]Division of Social and Administrative Sciences in Pharmacy, Oscar Rennebohm School of Pharmacy, University of Wisconsin-Madison
[2]Arnold & Marie Schwartz College of Pharmacy and Health Sciences, Long Island University, Brooklyn, New York City
[3]School of Pharmacy, Philadelphia College of Osteopathic Medicine, Suwanee, Georgia
*Corresponding author: desaikaru@gmail.com

Received September 09, 2014; Revised September 20, 2014; Accepted September 22, 2014

Abstract Aim: To (i) assess participants' awareness of the availability of genetic testing to determine the risk of different types of cancer; (ii) to assess participants' beliefs about genetic testing for the risk of lung cancer using Health Belief Model; and (iii) to explore factors affecting intention to use genetic testing for risk of lung cancer. Methods: A sample of 360 New Jersey residents were surveyed by interviewers from three densely populated cities in the northern, central and southern regions of New Jersey. The survey instrument was developed using the Health Belief Model and measures were adapted from the literature. Descriptive statistics and regression analyses were used to examine factors associated with intention to use genetic testing. Results: A total of 360 individuals were surveyed in three cities in New Jersey. Of these, 50% were non-Hispanic White, female, and with an annual income of less than $50,000; 66% were nonsmokers without a family history of lung cancer. The overall intention to use the genetic test to determine lung cancer risk was low (35%), even though the majority of participants believed genetic testing for lung cancer to be highly beneficial, and despite believing it to be a severe condition [M(SD)=11.5(2.3)}. Approximately 50% of participants were aware of the availability of genetic tests for the risk of lung cancer, and respondents believed they were moderately susceptible to lung cancer [M(SD)=25.3(3.7)].Gender, education, smoking habits and perceived benefits of testing were significant predictors of intention. Conclusion: Awareness and intention to use genetic testing for the risk of lung cancer was low. This study provides useful information for healthcare professionals interested in promoting the use of genetic testing for at-risk populations such as smokers, and how to tailor interventions.

Keywords: *intentions, genetic test, lung cancer, beliefs/attitude, health belief model, awareness*

Cite This Article: Karishma Desai, Bupendra Shah, Hamid Rahim, Hongjun Yin, and John Lonie, "Genetic Testing for Risk of Lung Cancer: A Pilot Study Examining Perceived Benefits and Barriers using Health Belief Model." *American Journal of Cancer Prevention*, vol. 2, no. 2 (2014): 24-30. doi: 10.12691/ajcp-2-2-2.

1. Introduction

Currently, approximately 900 genetic tests are available for screening, identifying susceptibility and diagnosing various disease conditions [1]. A genetic test for lung cancer susceptibility is one such test. Given that reducing mortality and morbidity associated with lung cancer is an important national priority [2], studies show that genetic tests for lung cancer risk could help improve preventative behaviors such as increased usage of smoking cessation services and higher quit rates/intention to quit among smokers and early detection screening [3,4]. While the merits of the utility of a genetic test for identifying lung cancer risk are still being debated [5,6], the growing market for genetic tests suggests that these tests will be soon be widely and easily accessible to the general public, particularly through the use of internet. Already, companies developing these tests have begun marketing them, with little or no regulation of outcome claims [7].

Many studies have examined public interest and ultimately use of genetic testing for cancer risks. A majority of these studies have focused on genetic testing for breast, ovarian and colon cancer risk [8-13]. Research examining public interest in genetic tests for lung cancer risk is sparse and focused mainly on high-risk populations, such as smokers [4,14] and relatives of lung cancer patients [15]. Although as of now, the genetic test for lung cancer susceptibility is mainly used or promoted for smokers, a lot of health decisions are influenced by friends and family. Hence, exploring the perceptions of general population, who may be former smokers, current smokers or non-smokers connected to smokers, is extremely valuable if informed decisions are to be made about whether or not to utilize genetic tests for lung cancer. In order to create well defined, targeted educational programs, assessment of the public's awareness, perception and

intention to use genetic tests for lung cancer risk must be conducted. Therefore, the objective of this study is to assess public awareness, perceptions and intention to use genetic testing for the susceptibility to lung cancer as well as identifying the factors which may affect intention to use a genetic test to screen for lung cancer risk.

2. Methods

The Health Belief Model (HBM) [16] served as the theoretical basis for developing the conceptual framework of this study. A diagrammatic representation of the conceptual framework is presented in Figure 1. In addition to the HBM constructs, several additional variables were included from relevant literature. For example, awareness of genetic testing, family history and smoking habits have often been discussed in the literature as important variables associated with intention to use genetic tests [11,13,17-24]. Also, demographic variables such as gender, education, age and ethnicity were other factors that appear to be related to awareness and intention to use genetic testing, were included [10,18,20,22,25,26]. The main outcome variable for the study was intention to use a genetic test in order to assess lung cancer risk. The independent variables were individual awareness that these tests exist; perceived beliefs of individual susceptibility to developing lung cancer; individual knowledge of the severity of lung cancer; barriers to getting genetically tested; and benefits to getting tested. In addition to demographic factors, including family history and smoking habits were examined.

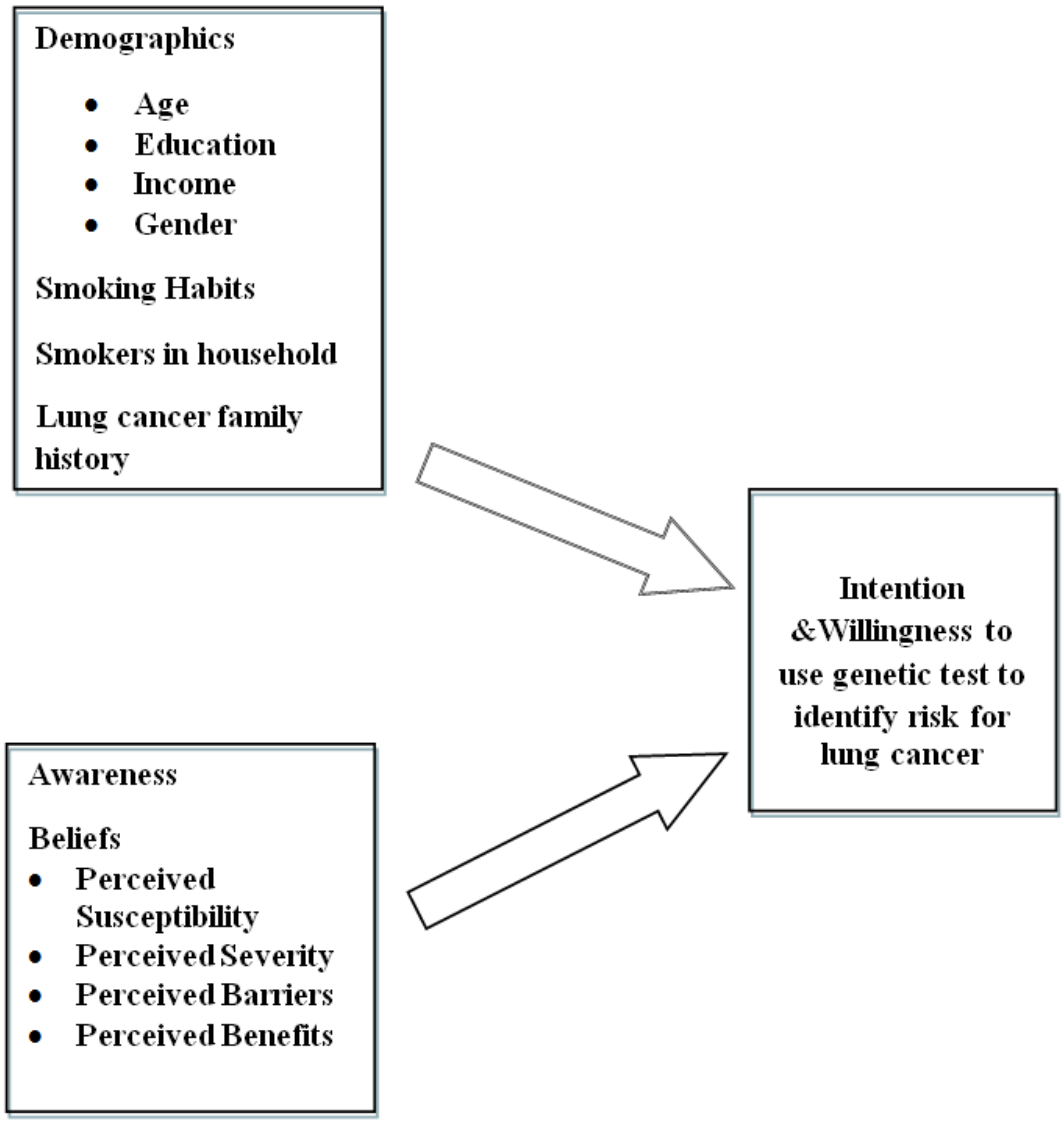

Figure 1. Diagrammatic Representation of Conceptual Framework

2.1. Design

A cross-sectional survey design was used for this pilot study. Researchers approached individuals 18 years or older, in central business and commercial areas such as city halls, shopping plazas, bus and train stations, during different times of the day, and in the three densely populated cities in the northern, central and southern regions of New Jersey, Newark, Elizabeth and Toms River. A sample size of 360 was determined using Cochran's equation for maximum variability [27], and a convenience sampling strategy was used. The study protocol was approved by the investigator's University Institutional Review Board. After informing participants of the purpose of the study. they received a copy of the survey.

Intention to use genetic tests for lung cancer risk was measured using a 2-item scale adapted from O'Connor and White (2009) [28] and measured participants' intention to use a genetic test for assessing lung cancer risk in two time frames (in the next 2 months, and in the next 1 year), using a Likert scale (1=strongly disagree to 5=strongly agree). *Awareness of the existence of genetic tests* was measured using a 5-item scale adapted from Bunn et al (2002) [13], which measured general awareness about genetic tests and availability of genetic tests for detecting breast, colon, prostate, and lung cancer risk, using a dichotomous response set (Yes/No). *The participant's Perceived susceptibility of lung cancer* was measured using a 7-item scale developed from items used by Smith and Croyle (1995) [29], Sanderson et al (2004) [30], and Nexoe et al (1999) [31], that used a Likert scale (1=strongly disagree to 5=strongly agree). *Perceived severity of lung cancer* was measured using a 3-item scale adapted from Nexoe (1999) [31], that used a Likert scale (1=strongly disagree to 5=strongly agree).

Perceived barriers to using lung cancer genetic test was measured using a 9-item scale developed from items used by Smith and Croyle (1995) [29], Sanderson et al (2004) [30], Nexoe et al (1999) [31], and Bunn et al (2002) [13], using a 5-point Likert scale (1=strongly disagree to 5=strongly agree). *Perceived benefits of using lung cancer genetic test* was measured using a 4-item scale developed from items used by Hahn et al (2006) [32], and Bunn et al (2002) [13], that used a Likert scale (1=strongly disagree to 5=strongly agree).

In addition to these, standard survey items were used to assess age, gender, race/ethnicity, education and family history of lung cancer. Family history of lung cancer was measured based on how closely related the participant was to the diagnosed relative, such as, first degree relative, second degree relative, distant relative. Participants were asked to choose the best suitable option provided.

2.2. Data Entry and Analysis

All completed survey data were screened for completeness and entered into SPSS version 17.0. Descriptive, reliability, factor, and regression analyses were conducted. For descriptive analysis, individual item frequencies, means and standard deviation were calculated. Total mean scores were calculated for each scale by summating responses on all items within the scale. These total mean scores were used to conduct regression analyses using a statistical significance of $P<0.05$.

3. Results

A total of 390 of 620 residents approached participated in the study (62.9% response rate). Of these, 360 (58%) had complete responses. Participants varied in age, race and education. Over half (52%) were female; 52% also had an annual income of less than $50,000; 60% were nonsmokers; and 67% had no family history of lung cancer (Table 1). Median age, education and gender were comparable to that of the general United States population, and comparable to the New Jersey population in terms of median age and gender (US Census 2011). The exploratory factor analysis and reliability analysis as described in Table 2 showed that the scales utilized in the study had excellent psychometric properties.

Table 1. Demographics

Variable		Frequency	Percent
Gender(N=359)	Male	170	47.2
	Female	189	52.5
Ethnicity(N=349)	Non-Hispanic White	142	39.4
	Hispanic	50	13.9
	African American	65	18.1
	Asian Pacific Islander	46	12.8
	Other	46	12.8
Age(N=353)	18-25	96	26.7
	26-35	84	23.3
	36-45	50	13.9
	46-55	67	18.6
	56-65	40	11.1
	66 & Above	16	4.4
Annual income(N=340)	Less than 50K	188	52.2
	50K-74K	69	19.2
	75K-100K	38	10.6
	Over 100K	45	12.5
Education(N=357)	High School	90	25.0
	Some College	66	18.3
	Associates Degree	38	10.6
	College Degree	93	25.8
	Post College Degree	70	19.4
Smokers in household(N=354)	0	205	56.9
	1	67	18.6
	2	32	8.9
	3 & more	50	13.9
Lung cancer family history(N=355)	First Degree	31	8.6
	Second Degree	43	11.9
	Any other relative	9	2.5
	Friend	29	8.1
	No-one	243	67.5
Smoking habits(N=359)	Non-Smokers	216	60.2
	Smokers	80	22.3
	Former Smokers	63	17.6

3.1. Descriptive Analysis of Study Variables

Individual item and scale mean scores for each measure used in this study are presented in Table 3. Overall, less than one-third (28.6%) of participants were aware of genetic testing. The highest awareness was for availability of genetic tests for the risk of breast cancer (63%), and the lowest for the risk of lung cancer (55.8%).

Participants perceived their susceptibility to lung cancer to be moderate, with items related to perceived susceptibility of lung cancer for smokers demonstrating higher means when compared to other items in the susceptibility scale. This suggested that most people in the study believed smokers were at higher risk for lung cancer. Participants perceived moderate barriers to using genetic testing for lung cancer. These barriers were related to the financial burden of purchasing and using the test. In addition, apprehension of being at high risk to develop lung cancer was itself a barrier. Only about 35% of participants intended to use genetic testing within the next 2 months, whereas about 43% intended to use it within the next 1 year, indicating the overall intention and interest in the test was moderate.

Table 2. Results of Exploratory Factor Analysis of Study Scales (*Factor loadings and communalities based on a principle components analysis with varimax rotation*)

	Awareness	Severity	Benefits	Barriers	Susceptibility
Definition of genetic testing	.691				
Breast cancer	.794				
Colon cancer	.850				
Prostate Cancer	.850				
Lung Cancer	.794				
I can get lung cancer.					.718
A smoker who worries about lung cancer is being realistic.		.285			.520
Most smokers suffer from lung cancer in the future.		.274			.451
I worry about getting lung cancer.					.776
I am less healthy than other people my age.					.402
Smoking can cause lung cancer.					.791
Smoking can lead to other problems apart from cancer.					.761
I am afraid lung cancer will make me very sick.		.480			.257
If I had lung cancer, I would not be able to manage daily activities.		.539			
Lung cancer may lead to other serious health problems.		.679			
I do not think I know enough about genetic testing to want to take the test.				.464	
I do not want to make any llifestyle changes, and hence do not want to take the test.				.349	
I do not think getting tested for risk of lung cancer would be helpful.				.286	
In general I do not think genetic testing is reliable.				.357	
Genetic testing is too expensive.				.626	
The findings of the test would affect health insurance coverage for me and my family.				.552	
I would worry too much if the results indicated I had a higher risk.				.600	
I cannot afford to spend money on a test for risk of lung cancer.				.615	
If the test showed my risk is high, the financial impact on me & my family will be large.			.252	.676	
The results could inform my family members about their risk of lung cancer.			.609	.247	
Genetic testing for risk of lung cancer is a useful test.			.776		
I would want to know my risk for lung cancer by using this test.			.753		
The results could inform my family members about their risk of lung cancer.			.734		

Table 3. Descriptive Analysis of Study Variables

Scale and Items	**Mean (SD)**
Perceived Susceptibility of Lung Cancer Scale*	
1. I can get lung cancer.	3.37(1.15)
2. A smoker who worries about lung cancer is being realistic.	4.19(0.93)
3. Most smokers suffer from lung cancer in the future.	3.66(0.97)
4. I worry about getting lung cancer.	2.76(1.20)
5. I am less healthy than other people my age.	2.52(1.23)
6. Smoking can cause lung cancer.	4.40(0.77)
7. Smoking can lead to other problems apart from cancer.	4.43(0.81)
Perceived Susceptibility Scale Mean Score (Out of 35)	*25.3 (3.7)*
Perceived Severity of Lung Cancer Scale*	
1. I am afraid lung cancer will make me very sick.	3.61(1.19)
2. If I had lung cancer, I would not be able to manage daily activities.	3.69(1.06)
3. Lung cancer may lead to other serious health problems	4.21(0.87)
Perceived Severity of Lung Cancer Mean Score (Out of 15)	*11.5 (2.3)*
Perceived Barriers to Using Genetic Test for Lung Cancer Risk*	
1. I do not think I know enough about genetic testing to want to take the test.	3.34(1.12)
2. I do not want to make any lifestyle changes, and hence do not want to take the test.	2.69(1.07)
3. I do not think getting tested for risk of lung cancer would be helpful.	2.46(1.10)
4. In general I do not think genetic testing is reliable.	2.49(1.02)
5. Genetic testing is too expensive.	3.28(0.85)
6. The findings of the test would affect health insurance coverage for me and my family.	3.26(1.05)
7. I would worry too much if the results indicated I had a higher risk.	3.53(1.07)
8. I cannot afford to spend money on a test for risk of lung cancer.	3.10(1.09)
9. If the test showed my risk is high, the financial impact on me & my family will be large.	3.57(0.98)
Perceived Barriers Scale Mean Score (Out of 45)	*27.7 (4.9)*
Perceived Benefits of Using Genetic Test for Lung Cancer Risk*	
1. The results could inform my family members about their risk of lung cancer.	3.92(0.87)
2. Genetic testing for risk of lung cancer is a useful test.	3.83(0.87)
3. I would want to know my risk for lung cancer by using this test.	3.53(1.01)
Perceived Benefits Scale Mean Score (Out of 20)	*15.2 (2.9)*
Intentions to Use Genetic Test for Lung Cancer Risk	
1. I plan to use genetic testing to detect my risk of lung cancer in the next 2 months.	2.18(1.04)
2. I plan to use genetic testing to detect my risk of lung cancer in the next 1 year.	2.39(1.18)
Intention to Use Genetic Test for Lung Cancer Mean Score (Out of 10)	*4.6 (2.0)*

* Scale responses ranged from 1-Strongly Disagree to 5-Strongly Agree

3.2. Regression Analysis

Two linear regression models were used to examine and identify predictors of intention to use genetic testing for the risk of lung cancer. The first model examined the demographic predictors (Gender, Age, Ethnicity, Education, Annual Income, Number of Household Smokers, Lung Cancer Family History, Smoking Habits) to predict intention to use genetic testing to evaluate participants' perceived risk of lung cancer. The model accounted for 10% of variance in *intention* of using genetic testing for the risk of lung cancer among participants. As shown in Table 4, Gender (β=-0.441, α=0.032), Education (β=-0.246, α=0.001), and Smoking Habits (Non-Smokers, β=-0.589, α=0.029) were found to be significant predictors. This suggested that participants who were male, high school educated, and smokers had greater intention to use genetic testing for the risk of lung cancer. The second model identified whether awareness and perceived beliefs (susceptibility, severity, barriers and benefits) were significant predictors of intention to use genetic testing. In this model, perceived benefits (β=0.174, α=0.000) was the only significant variable to predict intention. This suggested participants who believed genetic testing was more beneficial demonstrated greater intention to use it for the lung cancer risk. These variables accounted for 7.8% variance in intention among participants to use the test for the risk of lung cancer.

Table 4. Results from Regression Analysis

Model I: Dependent Variable: Intention [a]					
Independent Variables (N=360)	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	6.80	0.60		11.29	0.00
Gender	-0.44	0.21	-0.11	-2.16	0.03*
Ethnicity	0.14	0.08	0.10	1.90	0.06
Age	-0.09	0.07	-0.07	-1.28	0.20
Annual income	-0.11	0.11	-0.06	-0.96	0.34
Education	-0.25	0.08	-0.19	-3.21	0.00*
Smokers in household	0.00	0.10	0.00	0.00	0.99
Lung cancer in the family	-0.07	0.07	-0.05	-0.93	0.34
Smoking Habits					
Smoker	1	-	-	-	-
Former Smoker	-0.56	0.33	-0.11	-1.68	0.10
Non-Smoker	-0.59	0.26	-0.15	-2.19	0.03
Model II: Dependent Variable: Intention [b]					
Independent Variables (N=360)	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	**Beta**	**Beta**		
(Constant)	1.40	1.02		1.38	0.17
Awareness	0.00	0.05	0.00	0.08	0.94
Perceived Severity	0.06	0.05	0.07	1.20	0.23
Perceived Barrier	-0.00	0.02	-0.01	-0.13	0.90
Perceived Susceptibility	-0.00	0.03	-0.00	-0.08	0.94
Perceived Benefit	0.17	0.03	0.26	4.74	0.00

a. R square=0.102b.
b R square= 0.078

4. Discussion

Almost half of the participants were aware that genetic tests existed for the risk of various cancers, which is similar to prior studies [13,23]. However, awareness was lowest for the availability of genetic testing for the risk of lung cancer. This may be because genetic tests for lung cancer risk have only recently been advertised, and primarily advertised to smokers. Overall, the participants perceived themselves as moderately susceptible to lung cancer. This is unlike other population-based studies which showed higher perceived susceptibility to breast and colon cancer [13,17]. Perceived susceptibility in this study may have been moderate because it is mostly believed that only smoking is the cause of lung cancer [33], and the sample constituted about 77% former- and non-smokers. This is important because smoking is one of the biggest risk factors for lung cancer, but not the only risk factor. Thus, it appears that there is a need for programs that educate the public's understanding of the risk factors for lung cancer (besides smoking).

The majority of participants believed that genetic testing is beneficial. Similar to previous studies, benefits to family members were perceived as the most important benefit of conducting this test [9,17]. Future qualitative studies should examine reasoning behind this perception and the added advantage of using genetic testing. Participants agreed that one of the major barriers for not seeking genetic testing was the cost of the test. Previous studies also reported financial costs as a major obstacle to genetic testing [9,17,23]. Companies manufacturing genetic tests and health insurance agencies promoting the use of genetic tests, may need to examine strategies to mitigate cost related concerns.

The overall intention to use genetic testing for the risk of lung cancer was low. This differs from other studies which found higher interest in being screened [32,34]. This may be explained by the fact that the population in this study was mostly nonsmokers from the general population, whereas previous studies examined high-risk populations. Future studies may want to consider a similar methodology using primarily smokers. Although no known study looked at intention among the general population, studies on smokers found smoking habits (number of cigarettes smoked) impacted interest in screening information and being screened [32]. Gender and education were significant factors in determining participants' intention to use genetic testing.. In a previous study [22], education was also found to be a predictor of

intention, suggesting one's level of education may impact intention to test.

The results of this study indicated participants who were male, high school educated, and smoked, showed greater interest in using genetic testing for the risk of cancer. As reported by the CDC [35], smoking was more common among male high school students. Considering the established link between smoking and lung cancer, high school educated males may have demonstrated greater interest in using genetic testing because they believed they were more likely to develop lung cancer. Program developers can apply these findings to create targeted programs that can educate the public about the benefits of genetic testing.

5. Conclusions

Overall, this study demonstrated that the public's awareness about genetic testing for lung cancer risk is limited. Most participants believed lung cancer to be a severe condition and saw testing as beneficial. Those who perceived benefits were more likely to have higher intentions to use genetic testing, but in general, the overall intention to use genetic testing to detect the risk of lung cancer was low. This study shows the need for efforts in increasing awareness about genetic tests. The study also provides perceptions on the genetic test for the risk of lung cancer which can be used to promote the use for at-risk populations.

6. Limitations

There are several limitations of this study. First, it was a cross-sectional study focused on intention to use rather than actual behavior. Also, the study methods may have elicited participation and social desirability bias. Furthermore, the sample was drawn from three cities across the state of New Jersey, which drew a predominantly young (below 35yrs) female sample in the median income range with a high school or some college education. Considering the limitations, these findings could be generalized with caution. Since Jonassaint et al (2010) found geographic location to be a significant factor in awareness, future studies may examine distinctly different geographic regions.

Declaration

The study was approved by the Institutional Review Board at Long Island University, Brooklyn and all procedures comply with the current laws of United States of America. The authors also declare no conflict of interest.

References

[1] Collins, F.C. *A Brief Primer on Genetic Testing*. 2003 April 30 2013 [cited 2013 10/14]; 1]. Available from: http://www.genome.gov/10506784.

[2] Services, U.S.d.o.H.a.H., *Healthy People 2020: Objectives*. 2011.

[3] Young, R.P., et al., *Smoking cessation: the potential role of risk assessment tools as motivational triggers.* Postgraduate Medical Journal, 2010. 86(1011): p. 26.

[4] Shepperd, J.A., et al., *Contemplating Genetic Feedback Regarding Lung Cancer Susceptibility.* Annals of Behavioral Medicine, 2014. 47(3): p. 395-403.

[5] Marcy, T.W., M. Stefanek, and K.M. Thompson, *Genetic testing for lung cancer risk.* Journal of general internal medicine, 2002. 17(12): p. 946-951.

[6] Carlsten, C. and W. Burke, *Potential for genetics to promote public health.* JAMA: the Journal of the American Medical Association, 2006. 296(20): p. 2480.

[7] deCodeme, *Lung Cancer*. 2011.

[8] Tambor, E.S., B.K. Rimer, and T.S. Strigo, *Genetic testing for breast cancer susceptibility: awareness and interest among women in the general population.* American Journal of Medical Genetics, 1997. 68(1): p. 43-49.

[9] Lerman, C., et al., *Attitudes about genetic testing for breast-ovarian cancer susceptibility.* Journal of Clinical Oncology, 1994. 12(4): p. 843.

[10] Durfy, S.J., et al., *Attitudes and interest in genetic testing for breast and ovarian cancer susceptibility in diverse groups of women in western Washington.* Cancer Epidemiology Biomarkers & Prevention, 1999. 8(suppl 1): p. 369.

[11] MacNew, H.G., et al., *Assessing the knowledge and attitudes regarding genetic testing for breast cancer risk in our region of southeastern Georgia.* The Breast Journal, 2010. 16(2): p. 189-192.

[12] Lerman, C., et al., *Genetic testing for colon cancer susceptibility: anticipated reactions of patients and challenges to providers.* International Journal of Cancer, 1996. 69(1): p. 58-61.

[13] Bunn, J.Y., et al., *Factors Influencing Intention to Obtain a Genetic Test for Colon Cancer Risk: A Population-Based Study* 1.* Preventive Medicine, 2002. 34(6): p. 567-577.

[14] McBride, C.M., et al., *Interest in testing for genetic susceptibility to lung cancer among Black college students "at risk" of becoming cigarette smokers.* Cancer Epidemiology Biomarkers & Prevention, 2005. 14(12): p. 2978.

[15] Sanderson, S.C., et al., *What can interest tell us about uptake of genetic testing? Intention and behavior amongst smokers related to patients with lung cancer.* Public Health Genomics, 2009. 13(2): p. 116-124.

[16] Hochbaum, G., S. Kegels, and I. Rosenstock, *Health belief model.* United States Public Health Service, 1952.

[17] Bosompra, K., et al., *Likelihood of undergoing genetic testing for cancer risk: a population-based study.* Preventive Medicine, 2000. 30(2): p. 155-166.

[18] McBride, C.M., et al., *The Behavioral Response to Personalized Genetic Information: Will Genetic Risk Profiles Motivate Individuals and Families to Choose More Healthful Behaviors?* Annual Review of Public Health, 2010. 31: p. 89-103.

[19] Nordin, K., J. Bjork, and G. Berglund, *Factors influencing intention to obtain a genetic test for a hereditary disease in an affected group and in the general public.* Preventive Medicine, 2004. 39(6): p. 1107-1114.

[20] Cornfield, J., et al., *Smoking and lung cancer: recent evidence and a discussion of some questions.* International Journal of Epidemiology, 2009.

[21] Asomaning, K., et al., *Second hand smoke, age of exposure and lung cancer risk.* Lung Cancer (Amsterdam, Netherlands), 2008. 61(1): p. 13.

[22] Glanz, K., et al., *Correlates of intentions to obtain genetic counseling and colorectal cancer gene testing among at-risk relatives from three ethnic groups.* Cancer Epidemiology Biomarkers & Prevention, 1999. 8(suppl 1): p. 329.

[23] Lacour, R.A., et al., *What women with ovarian cancer think and know about genetic testing.* Gynecologic Oncology, 2008. 111(1): p. 132-136.

[24] Singer, E., T. Antonucci, and J. Van Hoewyk, *Racial and ethnic variations in knowledge and attitudes about genetic testing.* Genetic Testing, 2004. 8(1): p. 31-43.

[25] Gan, Q., et al., *Disease burden of adult lung cancer and ischaemic heart disease from passive tobacco smoking in China.* British Medical Journal, 2007. 16(6): p. 417.

[26] Frost, S., L.B. Myers, and S.P. Newman, *Genetic screening for Alzheimer's disease: What factors predict intentions to take a test?* Behavioral Medicine, 2001. 27(3): p. 101-109.

[27] Israel, G.D., *Determining sample size*. 2003. p. 2007.

[28] O'Connor, E.L. and K.M. White, *Intentions and willingness to use complementary and alternative medicines: What potential patients believe about CAMs.* Complementary Therapies in Clinical Practice, 2009. 15(3): p. 136-140.

[29] Smith, K.R. and R.T. Croyle, *Attitudes toward genetic testing for colon cancer risk.* American Journal of Public Health, 1995. 85(10): p. 1435.

[30] Sanderson, S.C., et al., *Public interest in genetic testing for susceptibility to heart disease and cancer: a population-based survey in the UK.* Preventive Medicine, 2004. 39(3): p. 458-464.

[31] Nexoe, J., J. Kragstrup, and J. Sogaard, *Decision on influenza vaccination among the elderly: a questionnaire study based on the Health Belief Model and the Multidimensional Locus of Control Theory*. Scandinavian Journal of Primary Health Care, 1999. 17(2): p. 105-110.

[32] Hahn, E.J., et al., *Perceived risk and interest in screening for lung cancer among current and former smokers.* Research in Nursing and Health, 2006. 29(4): p. 359.

[33] Brownson, R.C., et al., *Demographic and socioeconomic differences in beliefs about the health effects of smoking.* American Journal of Public Health, 1992. 82(1): p. 99.

[34] Gibbons, F.X., *Intention, Expectation and Willingness*. National Cancer Institute. p. 8.

[35] Dube, S.R., et al., *Vital signs: Current cigarette smoking among adults aged= 18 years—United States, 2009.* MMWR: Morbidity & Mortality Weekly Report, 2010. 59(35): p. 1135-1140.