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Risk Information Exposure and Direct to Consumer Genetic Testing for BRCA Mutations among Women with a Personal or Family History of Breast or Ovarian Cancer

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Abstract

Background—Direct to consumer (DTC) BRCA testing may expand access to genetic testing and enhance cancer prevention efforts. However, it is not known if current DTC websites provide adequate risk information for informed medical decision-making.

Methods—284 women with a personal or family history of breast/ovarian cancer were randomly assigned to view a “mock” DTC commercial website (control condition: CC, n=93) or the same “mock” website that included information on the potential risks of obtaining genetic testing online. Risk information was framed two ways: risk information attributed to expert sources (ES, n=98) and unattributed risk information (URI, n=93). Participants completed an online survey. Endpoints were intentions to get BRCA testing, testing site preference and beliefs about DTC BRCA testing.

Results—Sample characteristics: mean age 39 (range 18–70), 82% white, mean education 3 yrs. college. Women exposed to risk information had lower intentions to get BRCA testing than women in the CC (adjusted odds ratio (OR) 0.48; 95% confidence interval (CI) 0.26–0.87, p=0.016), less positive beliefs about online BRCA testing (adjusted OR 0.48; 95% 0.27–0.86, p=0.014). Women in the ES condition were more likely to prefer clinic based testing than women in the CC (adjusted OR 2.05; 95% CI 1.07–3.90, p=0.030).

Conclusion—Exposing women to information on the potential risks of online BRCA testing altered their intentions, beliefs and preferences for BRCA testing. Policy makers may want to consider content and framing of risk information on DTC websites as they formulate regulation for this rapidly growing industry.

Keywords

communication; direct to consumer; BRCA; informed consent; cancer

Introduction

The landscape of cancer care is being significantly altered by two major trends in medicine: the explosion in publicly available cancer information and the shift in medicine towards patient autonomy and health consumerism(1–5). Commercial entities have been quick to capitalize on these changes through the use of direct to consumer (DTC) advertising and sales. While the ethics of DTC advertising have been widely debated, the upsurge in DTC sales of health products is potentially much more concerning. “Lifestyle drugs”, such as Viagra, are sold to consumers directly over the internet without a physician visit and high technology screening tests are available for patients on a self referral basis (6,7). One of the most controversial developments in DTC sales is the sale of genetic tests. Over 30 internet-based companies now sell a variety of DTC genetic tests including cancer susceptibility testing, pharmacogenetic testing, and single nucleotide polymorphism evaluation (8).

Potential disadvantages of DTC genetic testing include early market entry before the clinical validity of a test had been established, over utilization in low risk individuals, concern over the quality of tests, inadequate counseling, misinterpretation of the test results and poor guidance in post-test decision making (9–16). On the other hand, DTC genetic testing may have advantages such as greater patient autonomy, enhanced patient privacy, expanded access to genetic testing and general consumer education (10–15,17).

In the United States there is currently little mandatory oversight of laboratories that provide genetic tests or of the claims that companies can make regarding genetic testing services (18, 19). The American College of Medical Genetics has issued a policy statement concluding that genetic testing should be provided to the public only through qualified health professionals and that self-ordering of genetic tests is potentially harmful (16). Because of the concerns over DTC genetic testing, including evidence from a U.S. Government Accountability Office report which found that DTC nutrigenetic testing significantly misled consumers, new measures have been taken to regulate the industry (9,15,20). Recently, California and New York have moved to limit DTC genetic testing for state residents (21). Additionally, groups have called for the government to establish guidelines dictating the type of information that must be included in promotional material to ensure adequate informed consent. Specifically, the American Society for Human Genetics argued that all companies should provide information on all of the risks associated with testing in order to increase the potential for informed decision making (15).

The purpose of our study was to evaluate whether exposure to information on the potential risks of DTC BRCA testing in different formats would alter women’s beliefs about online BRCA testing and intentions to get BRCA testing. We hypothesized that women exposed to risk and benefit information for DTC genetic testing would have more negative beliefs about DTC genetic testing and have lower intentions to purchase genetic testing online, and that this effect would be greater for risk information presented by experts than unattributed risk information. Additional outcome variables relate to participant’s attitudes about DTC genetic testing. The theoretical basis of our study is the Integrated Model of Behavioral Prediction which has previously shown that behavioral beliefs, attitudes and intentions can be important predictors of health related behavior (22,23). We chose to study BRCA testing because it is currently available DTC and because it is a complex test that presents many potential risks when delivered DTC. Importantly, we focused on the potential risks of getting BRCA testing online, not the general risks of getting a test for a BRCA mutation. We also decided to manipulate source credibility in order to determine if we could increase the persuasive impact of the risk message. Prior work has shown that when information is delivered by a highly credible source (one that is perceived as trustworthy and expert), it is often more persuasive in changing attitudes and increasing behavioral compliance than a low-credibility source (24).

Materials and Methods

Study Design

This study is a randomized experiment to evaluate the effects of exposure to risk information for DTC BRCA testing on women's beliefs about online BRCA testing and intentions to get BRCA testing. The study was conducted from October 2006- October 2007. Participants completed a baseline telephone interview and then were randomized into three equal groups before viewing one of three online "mock" websites: the "mock" website alone (control condition, CC) or the "mock" website with the addition of either unattributed risk information (URI) or expert source risk information (ES). After viewing the online stimulus material the participants' completed an online survey. We obtained institutional board approval from the University of Pennsylvania.

Study Population

Women were invited to participate in the study if they were 18–80 years old and if they had a first or second degree relative with breast or ovarian cancer or if they had been diagnosed with breast or ovarian cancer before age fifty. Participants were excluded from the study if they had prior BRCA mutation testing, genetic counseling for hereditary breast and ovarian cancer (HBOC) syndrome, if they were unable to provide informed consent or if they were non-English speaking. Our inclusion criteria intended to recruit women who had an increased risk of having a BRCA gene mutation over the risk for women in the general population and for whom referral for genetic counseling might be considered. While there are no standardized referral criteria for BRCA mutation testing(25), we estimated the risk of carrying a BRCA gene mutation for all participants using the model on the Myriad Genetics website developed by Frank et al. (26,27) Patients were recruited through print and online advertisements and flyers. Figure 1 provides a flow diagram of enrollment and attrition.

Data Collection

Baseline data on potential covariates (awareness of BRCA testing, perceptions of having a BRCA mutation, interest in BRCA testing, personal and family history of cancer, Ashkenazi Jewish heritage, cancer worry and genetic determinism) were collected via a 20 minute telephone. At the end of the telephone interview, participants were given the link to the stimulus material which they could view at any time. Participants who had not viewed the site within 24 hours received a reminder telephone call. After participants viewed the stimulus material, they were automatically directed to an online survey.

Intervention

Our stimulus material consisted of a password protected "mock" website that was hosted on the Annenberg School for Communication web server. The stimulus material contained modified visual and text images from a commercial website that sells online BRCA testing. (28) The names, phone numbers and other possible direct identifiers were changed or eliminated on the "mock" website. The stimulus material contained 47 control pages that had general information on BRCA testing, testing procedures, the pros and cons of testing and endorsements for online testing. Participants in the risk conditions were exposed to the same information as control participants but, in addition, viewed one page that outlined the possible risks of online genetic testing. In line with behavioral models such as Cognitive-Social Theory, we selected risk information that we felt would be relevant to our population and that may offer a new framing of the potential risks and benefits of DTC BRCA testing(29). We identified four key concerns about DTC BRCA testing through a literature review(11–15,18,19,30–32), expert consultation and pre-testing with women who had a personal or family history of breast or ovarian cancer. The four key concerns (privacy, poor comprehension of test results, inadequate

emotional support, and inadequate support for subsequent medical decision making) were presented to participants in the risk conditions (Table 1). Information in the URI and the ES conditions were similar in content however, the ES condition also included information on the source of the risk information along with a citation. Participants could access the “mock” website from any computer connected to the internet and were not directly observed during mock website navigation. Once connected, participants were able to freely navigate the site for up to 30 minutes. Following 30 minutes or when the participants chose to exit (by selecting an exit icon), the mock website displayed 6 core web pages to ensure participant exposure to key concepts related to online BRCA testing (major indications for BRCA testing, possible decisions affected by BRCA status, some pros and cons of BRCA testing, logistics of online testing, services associated with online testing and advantages of online testing). We included a mandatory viewing of the core web pages in order to lower the chance that variation in our outcomes would be attributed to variations in exposure to key logistical or factual BRCA information. Participants in the intervention groups also viewed the assigned risk page to ensure risk information exposure.

Survey Instrument

Participants were automatically directed to a password protected online survey after viewing the stimulus material. We developed the baseline interview and survey based on literature review and expert consultation and used existing, validated measures when possible(33–43). The beginning of the survey included a short introduction that described BRCA gene mutation testing and defined internet companies and cancer genetic clinics.

Measures

Sociodemographic and Health Characteristics

We obtained self-reported information about age, race/ethnicity, education, marital status and health status through survey questions.

Outcome measures

Outcome measures are listed in Table 2. Beliefs about online BRCA testing were measured by 5 randomly ordered questions. After reverse coding the discrimination item, we created a belief index by summing the 5 belief items together (Cronbach’s alpha 0.69, inter-item covariance 0.88). Due to the non-normal and skewed distribution of our outcome variables and a desire to identify participants with strong intentions, beliefs, and preferences, we dichotomized our outcome measures. Intentions, testing preference site, trust and perceptions of enough information were dichotomized using the following schema: 1–4 (extreme left value to neutral) were coded as the reference group (zero) and 5–7 (right of neutral to extreme right) were coded as one. The belief item was dichotomized with the following schema 5–27 were coded as the reference group and 28–35 were coded as one (corresponding to an approximate 75% and 25% split).

Statistical Analysis

We used simple frequencies to determine participant characteristics and percent of participants in each outcome response category. Our study was powered to detect moderate to large effect sizes between groups. We estimated our probability of detecting a moderate effect (delta of 0.5) between any two groups to be between 86%–94% and our probability of detecting a large effect (delta of 0.75) between any two groups to be over 99% (assuming a two sided alpha of 0.05). Differences between groups were evaluated with Pearson’s chi square and ANOVA testing. We compared the combined risk group (URI and ES risk groups combined) with the control group and the individual risk groups (URI and ES risk groups separately) with the

control group. We used multiple logistic regression to adjust the associations between information exposure by group and our outcomes for potential confounding variables that were different by group at baseline. All hypothesis tests were two-tailed and used a significance level of $p=0.05$. All statistical analysis was conducted in STATA 10 (Stata Corp. College Station, Tex).

Results

The characteristics of the participants by condition are reported in Table 3. Overall, the mean age of participants was 39 years (range 18–70 years). Eighty-two percent of participants were white, 58% married, and they had a mean education of 3 years of college. The calculated risk of having a gene mutation in our study population ranged from 2.8% to 30%, with an average risk of 6.4%, which is well above the estimated population prevalence of 0.06–0.69(44–46)%. Participant characteristics were balanced between groups except Hispanic ethnicity and interest in BRCA testing at baseline. Variables balanced at baseline but not listed in Table 3 include awareness of BRCA testing, perceptions of having a BRCA mutation (absolute and comparative), cancer worry (frequency and extent) and perceptions of genetic determinism. Participants in the unattributed risk condition had a lower reported interest in BRCA testing at baseline and participants in the expert risk condition were less likely to be Hispanic.

Unadjusted main effects are shown for the control group and the combined risk group in Table 4 and for the control group and the individual risk groups in Table 5.

We modeled the relationships between the different conditions and our outcomes controlling for the variables that were not balanced at baseline (Table 6). Participants who were exposed to risk information had lower intentions to get BRCA testing (adjusted odds ratio (OR) 0.48; 95% confidence interval (CI) 0.26–0.87, $p=0.016$) and less positive beliefs about online BRCA testing (adjusted OR 0.48; 95% 0.27–0.86, $p=0.014$) than controls. Participants in the URI group had lower intentions to get BRCA testing than participants in the CC (OR 0.42; 95% CI 0.20–0.88, $p=0.022$). Women in the ES group had higher reported preference for clinic testing (adjusted OR 2.05; 95% CI 1.07–3.90, $p=0.030$) and more negative beliefs about internet testing (OR 0.41; 95% CI 0.20–0.83, $p=0.013$) than women in the CC. While it appears that there might be differing effects for the two risk conditions on intentions to get tested, testing preference site and beliefs about internet testing, it is important to note that for each outcome the confidence intervals of the expert risk and unattributed risk group overlap.

Discussion

To our knowledge, this is the first study to investigate the impact of exposure to risk information on women's beliefs about and intentions to purchase DTC BRCA testing. This study demonstrates that women's beliefs about DTC genetic testing, intentions to get BRCA testing and preference for where they get tested are altered by exposure to information on the possible risks of online BRCA testing.

Consistent with our hypothesis, we found that women who are exposed to information on some of the possible risks of DTC BRCA testing have more negative beliefs about DTC BRCA testing and have lower intentions to get BRCA testing than women in the control condition. These findings, while in line with our expectations, raise a number of important issues worth considering. First, if calls for increased risk information on DTC websites aim to optimize informed medical decision making our findings suggest that the inclusion of a limited amount of risk information in a commercial website will influence women's beliefs and possibly their behavior. Our purpose in including information about the possible risks of DTC BRCA testing was to expose women to more "balanced" information than that which is often seen on

commercial websites. Fair and balanced information provision is a key concept in the regulation of DTC advertising (18). Many of the commercial websites promote products but have little to no information on the risks of testing or on the risks of testing through the internet (9). The fact that the women in our experiment who were exposed to risk information had more negative beliefs about DTC testing and were more likely to prefer clinic based testing may mean that they had a greater appreciation for some of the possible risks of internet based testing and were perhaps more informed. However, the true impact of risk information exposure on informed consent is difficult to determine in a study of this nature and further research in this area is needed.

Second, the inclusion of information on the possible risks of internet BRCA testing on commercial websites may actually lower women's intention to get any type of BRCA testing. One possible explanation for this finding is that the item assessing overall intentions for testing was interpreted as assessing intentions for DTC BRCA testing given the setting in which the questionnaire was completed. In order to investigate this issue further, we examined the association between exposure to risk information on testing preference site and on beliefs about DTC BRCA testing for women who did not intend to get BRCA testing (analysis not shown). We found that women in the risk conditions who did not intend to get testing reported a higher preference for clinic based BRCA testing (75% vs. 63%, $p=0.08$) and had more negative beliefs about DTC BRCA testing (85% vs. 68%, $p=0.006$) than women in the control condition. While we speculate that these findings suggest that the women in our experiment may in fact be reporting lower intentions to get DTC BRCA testing rather than any type of BRCA testing, we cannot reach firm conclusions based our data. The alternative and potentially more concerning explanation (when considering women with an elevated risk for HBOC) is that the inclusion of risk information on commercial websites actually decreases overall intentions to get BRCA testing. Prior work has shown that educational interventions can decrease interest in genetic testing (47–49). In addition, there is ample literature suggesting that genetic testing is underutilized despite the fact that mutation carriers and other high-risk women have good options for cancer risk reduction (35,50–59). Possible reasons for low rates of utilization include lack of access to testing facilities, lack of awareness of genetic testing, psychological and family factors, perceptions of cancer survivability, cost, concerns over discrimination and lack of physician recommendation (52,60–65). If in trying to optimize informed consent in the area of DTC BRCA testing we inadvertently discourage at risk women from obtaining a BRCA test we may be doing more harm than good. These findings stress the need to conduct careful studies investigating the potential impact of regulation on behavior in order to reduce the potential for adverse consequences.

The third important finding of our study is that by including risk information on commercial websites we may shift demand for BRCA testing from the internet to the clinic. The current standard of care for BRCA testing is testing within the context of a multi-disciplinary cancer risk evaluation program. While this method of care delivery may be optimal, experts are concerned that there may not be enough genetic practitioners to meet the increasing demand for genetics services (66–68). Multidisciplinary risk evaluation clinics are not available in all states and physicians often lack the training or knowledge to provide genetic counseling (67, 69–73). As genetic testing becomes more commonplace, health educators and providers must prioritize continuing genetic medical education in order to keep up with consumer demand.

Our second hypothesis, that risk information presented by experts would be more persuasive than unattributed risk information, was not well supported by our data. While the data suggest that there may be some differences for risk frames, particularly that the ES frame may be more influential in shaping preferences for testing site than the URI frame, our small sample size and the resulting wide and overlapping confidence intervals make distinctions between risk frames impossible. In addition, while we tried to match the content of the ES and the URI

conditions as closely as possible, the language for the privacy and comprehension categories was not completely equivalent and could have confounded the small differences seen. Our inability to find differences between the two risk conditions leads us to believe either that the expert source condition was not more persuasive than the unattributed risk condition or that we have failed to detect a difference between our groups when one really exists. At this time, the estimated population level uptake of DTC BRCA testing is relatively unknown and we have assumed that moderate to large effect sizes would be of clinical importance. If, however, DTC BRCA testing becomes widely used, future work evaluating manipulations that detect small effects will be important. Future research on source credibility framing, as well as other types of framing, should be conducted in order to determine the most effective way to present risk information to consumers in the context of DTC genetic testing.

Our study has several limitations. The first limitation is that our relatively small sample size provided little power to detect differences in outcomes by risk frame. The second limitation is that our groups showed two imbalances at baseline: Hispanic ethnicity and interest in BRCA testing. However, when we added these covariates into our models, the effect of exposure on outcomes was preserved. The third limitation is that our sample was predominately white, relatively well educated and all participants had access to the internet. While internet users are the likely target audience for DTC genetic testing, we acknowledge that the findings from this sample might not generalize to other ethnic or socioeconomic groups. Additionally, commercial websites often change over time and current websites for DTC BRCA testing may provide different information to consumers than they provided when our “mock” website was developed. Furthermore, we studied only a limited number of potential risks of online BRCA testing in women who had a family or personal history of breast or ovarian cancer. The findings of this study may not generalize to other types of risk information, other types of DTC genetic testing or to average-risk populations.

With the rise in DTC access to cancer-related technologies policymakers will need to determine if consumers should have access to online genetic testing and if the information and claims on company websites should be regulated. This study demonstrates that exposure to information on the potential risks of online BRCA testing alters women’s beliefs about, preferences for and intentions related to BRCA testing. Because there might be positive and negative consequences of regulating commercial DTC information, we must ensure that we understand the potential impact of the proposed regulation on patients’ beliefs and intentions so that we can create policy that truly optimizes cancer prevention strategies.

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Figure 1.
Consort Flow Diagram

Table 1**Risk Information**

Domain	Example unattributed risk	Example expert risk
Emotional support	You might not have the emotional support from experienced doctors and counselors who have helped many people cope with testing for hereditary breast and ovarian cancer. With internet testing, you don't have the traditional doctor-patient relationship or meaningful, face- to- face genetic counseling.	You might not have the emotional support from experienced doctors and counselors who have helped many people cope with testing for hereditary breast and ovarian cancer if you have testing online. Patricia Roche, J.D. and George Annas, J.D., M.P.H. of the Boston University School of Public Health have expressed concern that using the internet for genetic testing sidesteps the doctor-patient relationship and eliminates meaningful, face- to- face genetic counseling.
Privacy	You might not have the same privacy protections if you have testing online. Online companies are not regulated by the Health Insurance Portability and Accountability Act (HIPAA).	You may not have the same privacy protections if you obtain genetic testing online. Adam Wolfberg, MD. M.P.H., of Tufts University, points out that, unlike physicians and hospitals, companies that offer online testing are not subject to the privacy restrictions of the Health Insurance Portability and Accountability Act (HIPAA).
Comprehension of test results	You might not understand the test results as completely if you have testing online. The results of genetic tests are not always "black and white". That makes interpretations and explanations of the meaning of tests difficult.	You might not understand the test results as completely if you have testing online. "Genetic test results can be difficult to interpret... and genetic counseling or physician consultation might help people better appreciate the meaning of their test results" explain Sarah Gollust, B.A., Benjamin Wilfond, M.D. and Sara Chandros Hull, Ph.D., a genetics team at the National Institutes of Health
Subsequent medical decision-making	You might not get information that can help you make important medical and lifestyle decisions. Genetic test results are complex and you don't want to make any decisions based on incomplete, inaccurate or misunderstood information.	You might not get information that can help you make important medical and lifestyle decisions if you have testing online. "Genetic test results can be complex and serious. You don't want to make any decisions based on incomplete, inaccurate or misunderstood information," cautions The Food and Drug Administration, the Centers for Disease Control and Prevention (CDC) and the Federal Trade Commission (FTC) in a recent statement about online and "at-home" genetic tests.

Table 2**Outcome Measures**

Outcome	Question	Scale
Intend to get BRCA Testing	"How likely is it that you will get a BRCA test in the next 12 months?"	1–7 point rating scale from very unlikely to very likely
Positive Beliefs about Internet Testing	<p>"Please tell me how much you agree or disagree with each statement about internet testing for a breast cancer gene mutation. Using an internet company to get a BRCA test would..."</p> <ul style="list-style-type: none"> • "provide me with enough information on the test and its advantages and disadvantages" • "be convenient", • "provide me with the counseling resources that I need to make health and lifestyle decisions" • "allow me to keep my privacy" • "cause me to be discriminated against for health or life insurance". 	1–7 point rating scale from very strongly disagree to strongly agree
Preference for Clinic Testing	"If you were to get a BRCA test, are you more likely to get a test from an internet company or by going to a cancer genetics clinic?"	1–7 point scale from definitely internet company to definitely cancer genetics clinic
Trust in Internet Testing	"I would trust the results more if I was tested for a BRCA mutation through..."	1–7 point scale from a cancer genetics clinic to an internet company
Believe Internet Testing is Wise	"Getting a BRCA test from an internet company in the next 12 months would be..."	1–7 point scale from a foolish to wise
Site Provides Enough Risk Information	"The information that you viewed on the simulated website provided enough information about the possible risks that people might face if they decided to purchase BRCA testing from an internet company"	1–7 point scale from strongly disagree to strongly agree

Table 3

Participant Characteristics by Group

Characteristic	Control Mean (n=93)	Unattributed Risk Mean (n=93)	Expert Risk Mean (n=98)	χ^2 -value (or f-value)	p-value
Age, mean (SD)	39.0 (12.3)	39.7 (13.2)	38.2 (12.7)	0.53	0.77
Education, mean (SD)	15.46 (2.52)	15.63 (2.44)	14.91 (2.49)	0.57***	0.84
Sex (% Women)	100	100	100	---	---
Ethnicity (%)	---	---	---	6.35	0.61
White	86.67	80.65	78.35	---	---
Black	8.89	12.9	10.31	---	---
Asian	2.22	2.15	7.22	---	---
Other	2.22	4.3	4.12	---	---
Hispanic (%)	5.56	3.23	0	5.26	0.07
Employed Full-Time (%)	56.67	63.44	50	3.47	0.176
Married (%)	55.56	63.44	55.21	1.66	0.44
Health Insurance (%)	87.78	84.95	86.6	0.32	0.85
Works in Health Care (%)	27.78	18.68	20.62	2.4	0.3
History of Cancer (%)	---	---	---	---	---
Breast	8.6	12.9	7.14	1.97	0.38
Ovarian	0	1.1	0	2.06	0.35
Frank Risk, mean (SD)	0.069 (0.04)	0.059 (0.4)	0.065 (0.04)	1.6	0.45
Interested in Testing at Baseline (%)	---	---	---	10.98	0.03*
No	5.38	16.13	8.16	---	---
Yes	66.67	47.31	64.29	---	---
Don't Know	27.96	36.56	27.55	---	---

*
p < 0.05***
f-value, not χ^2

Table 4

Frequency of Outcomes: Combined Risk Group

Outcome Measure	No Risk (%)	Combined Risk Group (%)	χ^2 -value	p value
Intend to get BRCA Testing	30	17	5.9	0.015
Positive Beliefs about Internet Testing	33	19	6.2	0.012
Preference for Clinic Testing	62	72	2.8	0.095
Trust in Internet Testing	64	65	0.03	0.870
Believe Internet Testing is Wise	43	36	1.6	0.213
Site Provides Enough Risk Information	63	68	0.83	0.364

Table 5

Frequency of Outcomes: Individual Risk Groups

Outcome Measure	No Risk (%)	Unattributed Risk (%)	Expert Risk (%)	χ^2 -value	p value
Intend to get BRCA Testing	30	15	19	6.4	0.040
Positive Beliefs about Internet Testing	33	21	17	6.7	0.036
Preference for Clinic Testing	62	67	77	5.3	0.071
Trust in Internet Testing	64	59	71	3.2	0.202
Believe Internet Testing is Wise	43	34	37	1.7	0.436
Site Provides Enough Risk Information	63	70	67	1.0	0.606

Table 6

Multivariate Models* for Individual Risk Groups Compared to the Control Group

Outcome Measure	Odds Ratio (95% CI)	p-value
Intend to get BRCA Testing		
Combined Risk	0.48 (0.26–.87)	0.016
Unattributed risk	0.42 (0.20–0.88)	0.022
Expert Risk	0.53 (0.27–1.05)	0.072
Positive Beliefs about Internet Testing		
Combined Risk	0.48 (0.27–0.86)	0.014
Unattributed risk	0.56 (0.28–1.10)	0.092
Expert Risk	0.41 (0.20–0.83)	0.013
Preference for Clinic Testing		
Combined Risk	1.53 (.90–2.62)	0.117
Unattributed risk	1.18 (0.64–2.18)	0.590
Expert Risk	2.05 (1.07–3.90)	0.030
Trust in Internet Testing		
Combined Risk	1.06 (0.63–1.82)	0.813
Unattributed risk	0.78 (0.43–1.44)	0.431
Expert Risk	1.46 (0.78–2.73)	0.233
Believe Internet Testing is Wise		
Combined Risk	0.73 (0.44–1.22)	0.234
Unattributed risk	0.70 (0.38–1.27)	0.240
Expert Risk	0.76 (0.42–1.38)	0.374
Site Provides Enough Risk Information		
Combined Risk	1.27 (0.75–2.17)	0.371
Unattributed risk	1.37 (0.74–2.55)	0.317
Expert Risk	1.19 (0.65–2.18)	0.581

* Controlling for baseline interest in testing and Hispanic ethnicity

The first line below the outcome variable reports the multivariate model for the combined risk group and covariates.

The third and fourth lines below the outcome variable report the multivariate model for the individual risk groups and covariates.