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## Public Awareness of Direct-to-Consumer Genetic Tests: Findings from the 2013 U.S. Health Information National Trends Survey

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### Abstract

Although the availability of direct-to-consumer (DTC) genetic testing has increased in recent years, the general public's awareness of this testing is not well understood. This study examined levels of public awareness of DTC genetic testing, sources of information about testing, and psychosocial factors associated with awareness of testing in the U.S. Data were obtained from the nationally representative 2013 U.S. Health Information National Trends Survey. Guided by a social-cognitive conceptual framework, univariable and multivariable logistic regressions were conducted to identify factors associated with awareness of DTC genetic tests. Of 3,185 participants, 35.6% were aware of DTC genetic tests, with the majority learning about these tests through radio, television, and the Internet. In the final adjusted model, participants with annual incomes of \$99,999 or less had lower odds of being aware of DTC genetic testing (ORs ranging from 0.46–0.61) than did those participants with incomes of \$100,000 or more. The odds of awareness of DTC genetic tests were significantly higher for those who actively seek cancer information (OR = 1.91, 95% CI = 1.36–2.69), use the Internet (OR = 1.81, 95% CI = 1.05–3.13) and have high numeracy skills (OR = 1.67, 95% CI = 1.17–2.38). It will be critical for healthcare researchers and practitioners to understand predictors and consequences of the public's awareness of DTC genetic tests, as well as how such awareness may translate into DTC genetic testing uptake, health behavior change, and ultimately disease prevention.

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#### Conflict of Interest

The authors have no conflicts of interests or financial interests to disclose.

## Keywords

Health Information National Trends Survey (HINTS); direct-to-consumer genetic testing; behavioral research; psychosocial

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## Introduction

Direct-to-consumer (DTC) genetic tests, which are used to predict risks for multiple common diseases and traits, are advertised and sold directly to consumers, generally without the involvement of healthcare providers and traditionally with limited regulatory oversight [1]. The global DTC genetic testing market is projected to reach more than \$230 million by 2018 [2]. Yet, concerns do exist about the widespread availability of DTC genetic testing, including concerns over knowledge gaps in clinical validity and utility of DTC genetic tests, the potential for consumer misinterpretation of results, and the possibility for widening health-related communication inequalities [1] [3].

Recent events have highlighted the contentious nature of DTC genetic testing. In November 2013, the U.S. Food and Drug Administration (FDA) issued a warning letter directed towards a specific DTC company demanding an immediate halt to testing until the company receives FDA marketing authorization [4]. In July 2014, the FDA notified Congress that it will publish a proposed risk-based oversight framework for laboratory developed tests (LDTs) that are designed, manufactured, and used within a single laboratory [5]. Although society awaits the FDA's guidance on LDTs and traditional diagnostics, which include DTC genetic testing, it is clear that DTC genetic testing, in one form or another, is here to stay.

Yet, what is less clear is how these widely-publicized events may ultimately affect the public's interest in and attitudes about DTC genetic testing and other applications of gene sequencing technologies. It is possible, for example, that public debates about the validity and acceptability of these tests could erode trust, diminish interest, or even heighten curiosity. Each of these scenarios may require focused communication and educational efforts to ensure that the public has an accurate understanding of DTC genetic testing. However, as a first step, it is important to determine the public's general awareness of DTC genetic testing, and the factors that may influence people's knowledge of DTC genetic testing. To date, little is known about awareness of DTC genetic testing in the general public. One study using national survey data found that in 2007, approximately 24% of African-American respondents, 30% of Hispanic respondents, and 35% of Caucasian respondents were aware of DTC genetic tests [6]. Another study reported that awareness of DTC genetic tests in the general U.S. population has increased from 29% in 2008 to 37% in 2011 [7].

Furthermore, there is a paucity of literature examining the characteristics of those who are aware of DTC genetic testing. Several studies have suggested that demographic factors are associated with DTC genetic test awareness. Consumers who are aware of DTC genetic tests are more likely to be Caucasian, highly educated, have health insurance, and have higher incomes than those who are unaware of these tests [8, 9]. Associations between awareness of DTC genetic testing in general, and cognitive and behavioral variables, have been largely

unexplored. However, earlier work investigating consumers' interest in genetic testing for hereditary breast and ovarian cancer suggests that cognitive factors may be relevant, as high perceived risk and worry were related to interest in genetic testing [10]. Similarly, a study of rural and Appalachian Kentuckians found that having a family history of cancer and worrying more about cancer predicted higher intentions to seek genetic testing [11]. Although these studies did not investigate DTC genetic testing, the results suggest the importance of understanding how cognitive and behavioral factors can influence DTC awareness.

Studies also suggest that information-seeking behavior may be associated with awareness of DTC genetic testing, in part because information-seeking behavior may lead to greater exposure to news reports, advertisements, messages, and web-based offers for genetic susceptibility testing. In one study, the majority of participants indicated they were most likely to seek additional information about DTC genetic testing from their physician or the Internet, although many misinterpreted the meaning of sample test results [12]. Consumers' ability to understand DTC genetic test results is an area of concern, given that these tests are generally provided without extensive expert advice or counseling. Consumers may have insufficient genetic health literacy and/or numeracy skills to evaluate the benefits and harms of genomic testing [13], and their comprehension of DTC test results may be impeded by how this information is communicated; results are often reported with terminology that uses risk ratios to explain the positive predictive value of developing disease [14]. Indeed, one study found that participants had limited understanding of the predictive power of genetic tests, which suggests difficulty in genetic risk comprehension as well as challenges in evaluating claims made in DTC genetic testing advertisements [15]. The extent to which such literacy or numeracy skills are associated with awareness of DTC genetic testing has rarely been examined, although one study has demonstrated that greater numeracy skills were associated with DTC genetic test awareness [6].

There is a dearth of critical information about the current awareness of DTC genetic testing in the American public. This study sought to: (1) assess prevalence of awareness of DTC genetic testing; (2) identify sources of information regarding DTC genetic testing; and (3) identify demographic, cognitive, and behavioral correlates of awareness of DTC genetic testing. To address these aims, data collected in 2013 through a nationally representative survey, the Health Information National Trends Survey (HINTS), were analyzed. Our selection of potential correlates of DTC genetic testing awareness was informed by a social-cognitive conceptual framework proposed by Glanz et al. [16], which was designed to explain psychosocial factors associated with genetic testing for colorectal cancer. Although, DTC genetic testing provides information for a variety of diseases and health conditions, we chose a theoretical framework from the cancer genetics literature given the substantial advances and history of genetic testing in the cancer context.

As depicted in Figure 1, this framework emphasizes the influence of background demographic factors on predisposing and enabling factors, which in turn are associated with consumers' interest in genetic testing. Although the 2013 HINTS did not assess use of DTC genetic testing, Figure 1 highlights how interest/awareness of genetic testing can influence testing intentions. *Predisposing* factors include cognitions and emotions regarding a health

threat that may contribute to the interest and intention to use genetic testing. *Enabling* factors include characteristics and behaviors that may promote or impede consumers' interest and intentions to use genetic testing. The HINTS survey assesses a wealth of psychosocial factors which are well aligned with the constructs specified by the conceptual framework. Thus, we investigated several of the variables originally examined by Glanz et al. [16] (e.g., age, education, cancer worry, risk perception), and also expanded the framework to include additional demographic, cognitive, emotional, and behavioral factors which may influence consumers' awareness of DTC genetic tests. Based on the theoretical and empirical literature, we hypothesized that DTC genetic testing awareness would be associated with background factors such as having a college education, higher income, health insurance, younger age (< 50 years), white race, and a personal or family history of cancer. Also, we hypothesized that awareness of DTC genetic testing would be associated with greater perceived cancer risk, worry about cancer, health and cancer information-seeking behavior, use of the Internet, and numeracy skills. Given the limited body of work on this topic, additional variables regarding cognitions about cancer were investigated in an exploratory nature.

## Materials and Methods

### Study Population

Data were obtained from the 2013 U.S Health Information National Trends Survey (HINTS 4, Cycle 3), a publicly available, population-based survey collected by the National Cancer Institute (NCI). HINTS employs a complex probability sampling design, and jackknife replicate weights can be used to render analyses nationally representative. HINTS collects data from non-institutionalized, civilian individuals who are 18 years and older, with African-Americans and Hispanics oversampled to ensure adequate representation. The 2013 HINTS survey was a single-mode mail survey that employed a random address sampling strategy and the Next Birthday Method for respondent selection [17]. Data were collected between September and December 2013. The study was approved by the National Cancer Institute (NCI) Institutional Review Board. For more information about HINTS, and to obtain a copy of the questionnaire, see <http://hints.cancer.gov>.

### Survey Design

Items for the 2013 HINTS survey were developed by NCI working groups consisting of NCI investigators (including several coauthors of this manuscript) and HINTS stakeholders. The HINTS management team chose final items from a pool of items that was developed by these working groups. All items went through extensive cognitive testing. For more information about item development, see <http://hints.cancer.gov/instrument.aspx>. For the present study, items were selected to match constructs referenced in the selected conceptual framework (Figure 1). The primary outcome of interest was awareness of a DTC genetic test. Participants were asked to answer 'yes' or 'no' to the following question: "Genetic tests that analyze your DNA, diet, and lifestyle for potential health risks are currently being marketed by companies directly to consumers. Have you heard or read about these genetic tests?" If the response was 'yes,' participants were asked to answer a follow-up question regarding sources of information about DTC genetic tests: "From which of the following

sources did you read or hear anything about genetic tests?” Participants were instructed to endorse as many options as applied from a predetermined list of information sources (*Newspaper; Magazine; Radio; Health professional; Family member; Social media; Television; Internet; Other; Have not heard of such a test; Not sure*).

**Demographic Factors**—Demographic variables included in analyses were gender, age, race (*White; Black/African American; Asian; Native Hawaiian/Pacific Islander; American Indian/Alaskan Native; multiple races*) and ethnicity (*Hispanic or Latino; non-Hispanic or Latino*), education (*less than high school; high school; technical, vocational, or some college; college graduate or post graduate*), and income. Self-reported family history of cancer (*yes/no or not sure*), personal history of cancer (*yes/no*), and possession of health insurance (*yes/no*) were also examined in relation to the primary outcome variable, as was self-reported health status (*excellent or very good; good; fair or poor*). Smoking status was calculated using two questions: “Have you smoked at least 100 cigarettes in your entire life?” (*yes/no*) and “How often do you now smoke cigarettes?” (*every day; some days; not at all*). Based on the widely accepted standard definitions, *smokers* were those who had smoked 100 cigarettes and still smoked every day or some days; *former smokers* were those who had smoked 100 cigarettes but did not smoke at all now; *never smokers* were those who had not smoked 100 cigarettes in their entire life.

**Predisposing Factors**—Multiple predisposing factors were included in the analyses. Cancer-related mortality salience was measured by the statement, “When I think about cancer, I automatically think about death.” Perceived ambiguity about cancer prevention recommendations was measured with the statement, “There are so many different recommendations for preventing cancer it’s hard to know which ones to follow.” Fatalism, or perceptions of hopelessness, concerning cancer was measured with the statement, “There’s not much you can do to lower your chances of getting cancer.” All of the preceding items were assessed on 4-point scales ranging from ‘*strongly disagree*’ to ‘*strongly agree*.’ Perceived cancer risk was assessed by a single item: “How likely are you to get cancer in your lifetime” (5-point Likert scale, ranging from ‘*very unlikely*’ to ‘*very likely*’). Worry about cancer was also assessed by a single item: “How worried are you about getting cancer” (5-point scale, from ‘*not at all*’ to ‘*extremely*’).

**Enabling Factors**—Enabling factors included objective numeracy, which was assessed with four items derived from the Newest Vital Sign [18], which consisted of math-related questions based on the interpretation of a nutrition label. Responses were scored as the total number of correct items (ranging from 0–4); however, because responses were unequally distributed this variable was recoded as “high numeracy” (all 4 items correct) or “low to moderate numeracy” (0–3 items correct). Other enabling behavioral factors were health and cancer information-seeking behaviors and Internet use. Health information-seeking was measured by one question: “Have you ever looked for information about health or medical topics from any source?” Cancer information-seeking was measured by asking “Have you ever looked for information about cancer from any source?” To assess Internet use, participants were asked “Do you ever go on-line to access the Internet or World Wide Web,

or to send and receive e-mail?" Each of the preceding items used 'yes' and 'no' response options.

### Statistical Analysis

Data were analyzed in SAS callable SUDAAN® 11.0.0. To control for bias in variance estimates in a complex sampling design, jackknife replicate weights were used [17]. Descriptive statistics were computed for the study variables. Next, univariable logistic regressions were performed to identify significant correlates of the primary outcome (awareness of DTC genetic tests). Then, predictors that were significant in univariable analyses were entered simultaneously into an initial multivariable logistic regression. Any predictor that did not remain significant in this initial multivariable logistic regression was removed to produce a final multivariable regression model.

## Results

### Participant Characteristics

Table 1 depicts demographic population characteristics, as well as for those individuals who were aware of DTC genetic tests. Data were available for a total of 3,185 participants; of whom 50.9% were female, 78.3% were White, 33.2% had completed a four year college degree, and 61.7% were currently employed. A total of 1,117 participants (35.1% unweighted, 35.6% weighted) had ever heard or read about DTC genetic tests.

### Sources of Information about DTC Genetic Testing

Among those participants who were aware of DTC genetic tests, a total of 1,101 provided information about the sources from which they had read or heard anything about these tests. The majority of individuals had learned about DTC genetic testing from radio or television (61.1%), the Internet (50.6%), and a newspaper or magazine (38.7%). Fewer had learned about testing from family members, health professionals, or social media (each approximately 16%).

### Correlates of Awareness of DTC Genetic Testing

Results from the univariable and multivariable logistic regressions are shown in Table 2. Several variables were significantly associated with awareness of DTC genetic testing in the univariable regressions, including demographic variables (education, income, and self-reported health status); predisposing factors (cancer-related mortality salience, fatalism concerning cancer, and perceived cancer risk); and enabling factors (cancer and health information-seeking, Internet use, and numeracy). However, when all significant univariable correlates were entered simultaneously, four variables remained significant. Income was the only demographic variable significantly associated with awareness of DTC genetic testing. Participants with annual incomes of \$99,999 or less had lower odds of being aware of DTC genetic testing (ORs ranging from 0.46–0.61) than did those participants with an income of \$100,000 or more. None of the predisposing factors were significantly associated with awareness of DTC genetic testing in this final model. Several enabling factors were associated with DTC genetic testing awareness. Those participants who actively sought cancer information had a greater odds of being aware of DTC genetic tests (OR = 1.91, 95%

CI = 1.36–2.69) than did those who did not seek cancer information. In addition, participants who reported prior Internet use had a greater odds of DTC genetic test awareness (OR = 1.81, 95% CI = 1.05–3.13) than did those participants who did not use the Internet. Finally, compared to those with low to moderate numeracy, participants with high numeracy had a significantly greater odds of being aware of DTC genetic testing (OR = 1.67, 95% CI = 1.17–2.38).

## Discussion

This study provided an update of current rates of awareness of DTC genetic testing in the U.S. population, as well as their sources of information about such testing: approximately 36% were aware of DTC genetic tests, and the majority reported learning about these tests through radio, television, and the Internet. Although awareness of DTC genetic testing has increased over the years, data suggest that awareness has not changed dramatically and may have plateaued in recent years, with rates being reported as 37% in 2011 [7] and 36% in 2013 for the present study.

Importantly, guided by a relevant social-cognitive conceptual framework [16], this study examined whether various demographic, cognitive, emotional, and behavioral factors were associated with the awareness of DTC genetic tests. In a multivariable model, awareness of DTC genetic testing was associated with income (demographic factor), cancer information-seeking behaviors, Internet use, and numeracy (enabling factors).

The fact that lower income was associated with decreased awareness of DTC genetic testing is consistent with other studies of DTC genetic testing. Currently, the estimated cost to purchase DTC genetic testing ranges from less than \$100.00 to more than \$1,000.00, depending on the type of test ordered [19], which is an out-of-pocket expense for the consumer. The observed association between income and DTC genetic testing awareness may reflect the fact that this testing is marketed to or seen as more affordable by those with higher incomes. In support of our finding, another population-based survey found an association between awareness of DTC genetic testing and higher income [8].

Contrary to the associations specified in our conceptual framework [16], none of the predisposing factors were significantly associated with awareness of DTC genetic testing in the final model. These factors, which consisted of cognitions and beliefs about various aspects of cancer, appear to be less relevant to consumers' awareness of DTC genetic testing. Given that DTC genetic tests typically provide risk estimates for a variety of different health conditions, consumers' beliefs about multiple diseases or the multifactorial causes of diseases [20] may be more relevant to their awareness of these tests. Awareness of DTC genetic testing was positively associated with the enabling factors of Internet use and cancer information-seeking behaviors. Such factors are likely relevant to awareness since they could increase consumers' exposure to these tests; DTC genetic tests are directly marketed and sold to consumers through the Internet, and the finding of an association between awareness of DTC genetic testing and Internet use corroborates previous research [7]. Studies show that information-seeking behavior is highly correlated with Internet access and use [21], which likely increases exposure to advertisements for DTC genetic tests. Our

finding of an association between awareness of genetic tests and cancer information-seeking behavior is consistent with another study that assessed smokers' interest in genetic testing to identify genetic susceptibility to nicotine addiction [22]. That study found that smokers' intentions to undergo genetic testing were positively related to their information-seeking behaviors [22]. Also, research suggests that consumers who believe there is an association between family history or genes and cancer risk are more likely to be seekers of cancer information [23].

We found a significant association between awareness of DTC genetic testing and a measure of objective numeracy. Specifically, those with high numeracy were more likely to be aware of DTC genetic testing than were those with low-to-moderate numeracy. Highly numerate individuals may be more likely to seek information about DTC genetic testing because they are confident in their ability to interpret their meaning and more often are exposed to medical websites where DTC genetic tests are advertised [24]. Health numeracy is important for the comprehension and application of mathematical concepts, which are often used in the field of genetics and genomics [13]. DTC genetic test results are often conveyed using numbers as estimates to communicate risk, yet there is concern that less numerate persons may have problems interpreting the results from DTC genetic tests. For example, a telephone survey of women with a negative breast biopsy and family history of breast or ovarian cancer found that most did not understand the difference between relative and absolute risk, terminology used in conveying genetic test results [25]. Similarly, a recent study of women at increased risk of breast and ovarian cancer found that less numerate women were more likely to incorrectly interpret ambiguous or uninformative negative *BRCA1/2* genetic test results than were highly numerate women [26]. Therefore, persons with limited numeracy skills may suffer from a number of challenges that negatively influence understanding of genetic risk information. Research is needed to understand how numeracy may influence understanding of genetic risk information and of public controversy regarding the validity and utility of DTC genetic testing, as well as decision-making regarding use of DTC genetic testing, particularly in less literate and racially diverse populations.

This study provides novel information regarding current levels of awareness and sources of information regarding DTC genetic testing, as well as demographic, predisposing, and enabling factors associated with awareness of DTC genetic testing using nationally representative data; however, it has several limitations. One limitation is the cross-sectional study design, which does not allow inferences about causality. For example, it is not possible to know whether the correlates identified in this study actually preceded the consumers' awareness of DTC genetic testing. It remains possible that learning about genetic testing may have implications for consumers' cognitions, emotions, and behaviors. Furthermore, the cross-sectional nature of this study does not allow for the formal testing of the mediational relationships inherent in our social-cognitive conceptual framework. That is, it is not possible to determine to what extent the enabling factors we examined actually mediate the association between demographic factors and DTC genetic testing awareness. Additional prospective research is needed to understand the causal relationships between cognitive and behavioral factors and consumers' awareness of DTC genetic testing that are



specified in this conceptual framework. An additional limitation is that the 2013 HINTS survey did not include a question on DTC genetic testing use. Despite these limitations, this study is one of the first reports on DTC genetic testing that used a conceptual framework to inform and guide analyses of demographic, cognitive, affective, and behavioral factors. Future studies are needed to explore these relationships with a more comprehensive assessment of genetics questions. Such work would advance our understanding of the predictors and consequences of DTC genetic testing awareness, and could also provide evidence to help refine this conceptual framework and continue to extend its applicability to novel genetic testing technologies.

DTC genetic testing is fraught with many challenges including inconsistency in disease risk estimates across companies, lack of established clinical utility and validity, and misleading web-based advertisements [1] [3]. Our results indicate that only 36% of the American public is aware of DTC genetic testing, indicating both a need and an opportunity for educating the public about the availability, utility, and limitations of these tests. Ensuring that the public has a complete understanding of the characteristics of DTC genetic tests and is able to make appropriate, informed decisions about their use will require efforts from policy makers, clinicians, and researchers. The FDA's oversight will be important to ensure that DTC genetic testing companies provide accurate, consistent and reliable results. Health communication and educational efforts will be necessary to establish knowledge among the general public about the characteristics, potential benefits, and limitations of DTC genetic testing and the risk information it provides. Clinicians will likely be faced with the challenges of addressing concerns or questions about the low predictive power and uncertain clinical validity of DTC genetic testing, and with helping their patients to determine how this risk information may be relevant to their lives. Consistent with our findings, different communication strategies may be needed based on their patients' characteristics (including their economic resources, experiences with information seeking, and numeracy levels). To promote these communication and educational efforts, it will be critical for healthcare researchers and practitioners to understand predictors and consequences of people's awareness of DTC genetic tests, as well as how such awareness may translate into DTC genetic testing uptake, health behavior change, and ultimately disease prevention.

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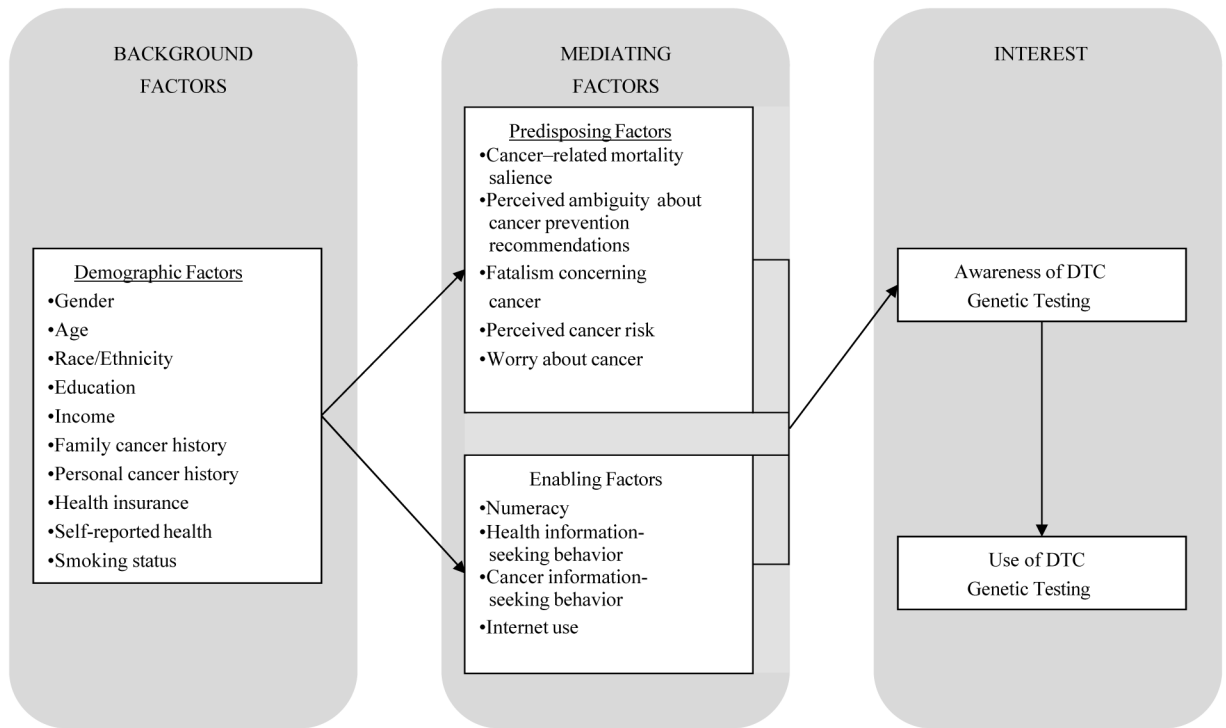
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**Figure 1.** Proposed conceptual framework (adapted from Glanz et al. 1999)

**Table 1**

Demographic Characteristics (Counts and Weighted Percentages), HINTS 4 Cycle 3

Demographic Characteristic	Full sample N = 3,185 n (weighted %)	Aware of genetic test n = 1,117 n (weighted %)
Gender		
Male	1139 (49.1)	414 (53.2)
Female	1753 (50.9)	613 (46.9)
Age		
18–34	426 (27.2)	131 (23.8)
35–49	712 (30.5)	246 (30.3)
50–64	1070 (25.1)	456 (32.1)
65+	874 (17.3)	264 (13.9)
Race		
American Indian/Alaskan Native	15 (0.5)	3 (0.5)
Asian	136 (5.5)	54 (6.6)
Black/African American	546 (12.9)	139 (11.0)
Native Hawaiian/Pacific Islander	12 (0.5)	6 (0.2)
White	2078 (78.3)	794 (78.5)
Multiple races selected	104 (2.2)	41 (3.2)
Ethnicity		
Hispanic or Latino	511 (15.0)	142 (12.6)
Non-Hispanic or Latino	2301 (85.0)	881 (87.4)
Education		
Less than high school	297 (9.7)	58 (5.7)
High school	699 (24.5)	163 (17.3)
Technical, vocational, or some college	933 (32.7)	309 (31.5)
College graduate or post graduate	1167 (33.2)	564 (45.5)
Occupational Status		
Employed	1584 (61.7)	613 (66.0)
Unemployed, homemaker, student, retired, disabled, or other	1448 (38.3)	462 (34.0)
Income		
\$0–19,999	680 (20.2)	176 (12.6)
\$20,000–49,999	812 (29.2)	254 (24.4)
\$50,000–99,999	780 (31.3)	320 (34.8)
\$100,000+	467 (19.3)	246 (28.2)
Smoking Status		
Smoker	486 (19.4)	135 (15.8)
Former Smoker	856 (24.9)	316 (25.2)
Never Smoker	1798 (55.7)	661 (59.0)
Self-Reported Health Status		
Excellent or very good	1434 (48.2)	568 (50.8)
Good	1125 (37.9)	408 (39.1)

<b>Demographic Characteristic</b>	<b>Full sample N = 3,185 n (weighted %)</b>	<b>Aware of genetic test n = 1,117 n (weighted %)</b>
Fair or poor	529 (13.9)	137 (10.1)
Health Insurance Status		
Insured	2782 (83.0)	1004 (85.4)
Not Insured	354 (17.0)	98 (14.6)
Family Cancer History		
Yes	2012 (72.6)	761 (73.4)
No	761 (27.4)	244 (26.6)
Personal Cancer History		
Yes	459 (8.1)	192 (9.3)
No	2676 (91.9)	910 (90.7)
Numeracy (number correct)		
High numeracy (4 correct)	1129 (51.2)	553 (62.5)
Low to moderate numeracy	1196 (48.9)	362 (37.5)

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**Table 2**

Factors Associated with DTC Genetic Test Awareness

Aware of Genetic Test				
	Univariate Logistic Regression		Final Logistic Model (N=2,047)	
	OR	95% CI	OR	95% CI
Race				
White	1.00 (ref)			
American Indian/Alaskan Native	0.77	0.02 – 36.62		
Asian	1.32	0.82 – 2.13		
Black/African American	0.82	0.50 – 1.34		
Native Hawaiian/Pacific Islander	0.38	0.05 – 2.80		
Multiple races selected	1.88	0.67 – 5.26		
Ethnicity				
Hispanic or Latino	0.76	0.55 – 1.05		
Non-Hispanic or Latino	1.00 (ref)			
Age				
Male (ref is female)	1.28	1.00 – 1.64		
Education				
Less than high school	0.28	0.17 – 0.48		
High school	0.35	0.26 – 0.47		
Technical, vocational, or some college	0.54	0.41 – 0.70		
College graduate or post graduate	1.00 (ref)			
Income				
\$0–19,999	0.26	0.16 – 0.41	0.46	0.25 – 0.85
\$20,000–49,999	0.38	0.26 – 0.56	0.46	0.31 – 0.70
\$50,000–99,999	0.59	0.42 – 0.82	0.61	0.42 – 0.87
\$100,000+	1.00 (ref)		1.00 (ref)	
Smoking Status				
Smoker	0.66	0.43 – 1.01		
Former Smoker	0.94	0.67 – 1.33		
Never Smoker	1.00 (ref)			
Health Insurance (ref is no)	1.35	0.91 – 2.01		
Self-reported Health				
Excellent or very good	1.00 (ref)			
Good	0.97	0.71 – 1.34		
Fair or poor	0.58	0.37 – 0.90		
Family Cancer History (ref is no)	1.07	0.80 – 1.43		
Personal Cancer History (ref is no)	1.32	0.99 – 1.76		
Cancer-related Mortality Salience	0.86	0.75 – 0.98		
Fatalism Concerning Cancer	0.74	0.63 – 0.86		
Perceived Cancer Risk	1.17	1.02 – 1.34		

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<b>Aware of Genetic Test</b>				
	<b>Univariate Logistic Regression</b>		<b>Final Logistic Model (N=2,047)</b>	
	<b>OR</b>	<b>95% CI</b>	<b>OR</b>	<b>95% CI</b>
Worry about Cancer	1.06	0.96 – 1.18		
Ambiguity about Prevention Recommendations	0.88	0.76 – 1.02		
Cancer Information Seeking (ref is no)	2.43	1.90 – 3.12	1.91	1.36 – 2.69
Health Information Seeking (ref is no)	2.58	1.67 – 4.00		
Internet Use (ref is no)	3.14	2.25 – 4.37	1.81	1.05 – 3.13
Numeracy				
High numeracy (4 correct)	2.11	1.55 – 2.88	1.67	1.17 – 2.38
Low to moderate numeracy	1.00 (ref)		1.00 (ref)	

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