

## Background:

Genetic tests for certain mutations provide opportunities to reduce cancer risk by offering preventive strategies to those with elevated risk to mitigate or even eliminate cancer development.<sup>1</sup> The disparity in awareness may translate into disparities in the uptake of genetic testing, health behavior change, and disease prevention through precision and personalized medicine.

## Objectives:

This study aimed to examine the race/ethnicity disparity in disease-risk genetic testing (DRGT) awareness in the United States and further identify the factors associated with disease-risk genetic testing awareness among race/ethnicity groups.

## Methods:

A retrospective cross-sectional analysis was conducted using 2022 Health Information National Trends Survey (HINTS) data. HINTS is a nationally representative survey that has been administered every few years by the National Cancer Institute since 2003. The HINTS target population is all adults aged 18 or older in the civilian non-institutionalized population of the United States and it is designed to collect data on the American public's need for, access to, and use of health-related information and health-related behaviors, perceptions, and knowledge.

If participants reported that they have heard of disease risk genetic testing, they were considered as having awareness of disease risk genetic testing.

Descriptive analyses were performed among the participants with and without disease-risk genetic testing awareness. Survey-weighted logistic regressions with stepwise model selection were used to identify the factors influencing awareness of disease-risk genetic testing. A significance level of 0.2 s required to allow a variable entry into and stay in the model. Akaike Information Criterion (AIC) were used to assess the model performance. Further, factors related to disease-risk genetic testing among different race/ethnicity groups were identified.

Statistical analyses were performed with SAS software, version 9.4 (SAS Institute, Cary, NC, USA).

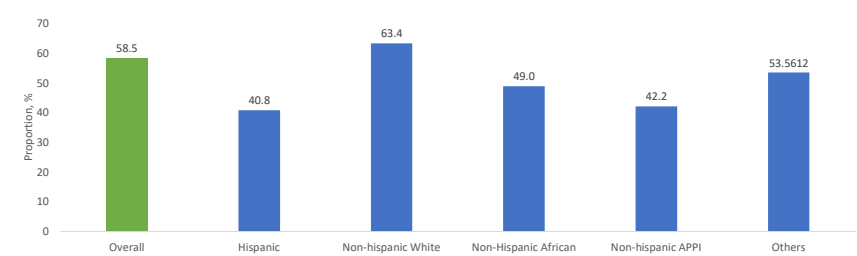
## Results:

- Among 5968 responders, 58.5% were aware of disease-risk genetic testing. The awareness varies among different racial/ethnic groups. (Figure 1)
  - Compared with non-Hispanic white participants, Hispanic, non-Hispanic African American (nH-AA), and Asian American and Pacific Islander (AAPI) participants were less likely to have DRGT awareness (adjusted-OR 0.49, 0.53, and 0.40, respectively, all p-values < 0.05). (Figure 2)
  - Participants with disease-risk genetic testing awareness are more likely to be younger, female, white, to have a higher education and household income, insurance, a regular provider, internet access, and a family history of cancer. Perceived genetic susceptibility, worry about cancer, and perceived progress of cancer treatment and prevention are higher among those with awareness. (All p-value<0.05) (Table 1)
  - Significant factors influencing DRGT awareness included age, race/ethnicity, education, family cancer history, and perceptions of the importance of genetics for cancer prevention. (Figure 2)
  - Factors associated with awareness of DRGT varied among racial/ethnic groups. (Table 2) For non-Hispanic White participants, age, regular provider visits, and family cancer history were significant. (Table 2.b) Among Hispanics, education, fatalistic beliefs, and cancer worry were significant factors. (Table 2.a) nH-AA showed significance in access to the internet and family cancer history. (Table 2.c) No statistically significant factors were observed for AAPI. (Table 2.d)
- Limitation:**
- Response rate of 2022 Health Information National Trends Survey was only 28%.
  - Awareness of disease risk genetic testing is based on self-reported survey response. It does not reflect the extent of knowledge and accuracy of knowledge of disease risk genetic testing.
  - This study was limited mall sample size among subgroup, especially for AAPI population. Further study focus on each racial/ethnic groups is warranted.
- Conclusion:**
- Disparities in disease risk genetic testing awareness exist, particularly among AAPI and their white counterparts.
  - Age, race, education, family cancer history, and perceptions of genetic and cancer prevention significantly impact DRGT awareness.
  - Factors associated with awareness of DRGT differ among racial/ethnic groups.
  - Addressing these differences is crucial in developing targeted promotion strategies.

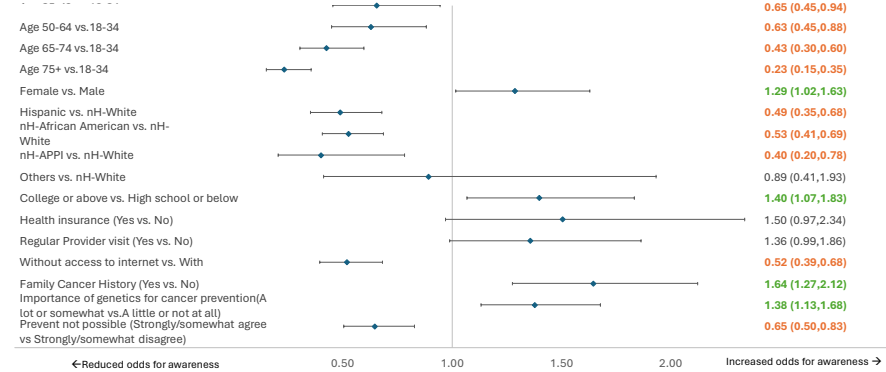
**Table 1** Descriptive characteristics of individuals who have awareness of disease risk genetic testing.

	Having awareness of DRGT	No awareness of DRGT	Unadjusted OR (95%CI)	P-value
Age, n(%)				<.0001
18-34	547 (27.5)	328 (22.8)	0.74 (0.53, 1.05)	
35-49	705 (25.2)	465 (24.5)	0.86 (0.61, 1.20)	
50-64	977 (29.1)	737 (26.2)	0.64 (0.47, 0.87)	
65-74	704 (12.51)	614 (14.1)	0.34 (0.23, 0.53)	
75+	324 (5.6)	488 (12.4)	1.35 (1.09, 1.69)	
Gender, n(%)				0.0005
Male	1179 (45.6)	1097 (53.8)	Ref	
Female	2001 (54.4)	1466 (46.2)	1.35 (1.09, 1.69)	
Race, n(%)				0.0001
Non-hispanic White	2002 (68.1)	1165 (51.2)	Ref	
Hispanic	435 (12.3)	550 (23.0)	0.40 (0.31, 0.53)	
Non-Hispanic African American	427 (9.6)	448 (12.9)	0.49 (0.38, 0.63)	
Non-hispanic AAPI	125 (4.4)	176 (7.8)	0.42 (0.22, 0.82)	
Others	94 (4.6)	72 (5.1)	0.99 (0.51, 1.94)	
Education level, n(%)				<.0001
High school or less	536 (22.0)	879 (36.4)	Ref	
College or above	2652 (78.0)	1682 (63.6)	1.87 (1.47, 2.37)	
Income Level, n(%)				<.0001
<19,999	360 (11.2)	574 (18.3)	Ref	
20,000-49,999	715 (19.7)	719 (26.8)	1.13 (0.80, 1.59)	
50,000-99,999	950 (32.0)	670 (30.9)	1.58 (1.12, 2.22)	
100,000-	1007 (37.0)	444 (24.0)	2.35 (1.66, 3.32)	
Having health insurance, n(%)				<.0001
No	217 (7.8)	275 (14.2)	Ref	
Yes	3055 (92.2)	2385 (85.8)	2.07 (1.42, 3.01)	
Having regular provider, n(%)				<.0001
No	284 (10.5)	389 (18.2)	Ref	
Yes	2986 (89.5)	2255 (81.8)	1.92 (1.46, 2.53)	
Without access to Internet, n(%)				<.0001
Have internet	2999 (92.7)	1963 (77.6)	ref	
No internet	288 (7.35)	716 (22.4)	0.31 (0.24, 0.40)	
Family history of cancer				<.0001
No	793 (27.9)	998 (43.8)	Ref	
Yes	2386 (72.1)	1546 (56.2)	1.94 (1.55, 2.42)	
Region				0.14
Midwest	595 (22.9)	414 (18.4)	Ref	
Northeast	493 (17.8)	394 (17.4)	0.85 (0.58, 1.23)	
South	1457 (37.1)	1250 (39.3)	0.75 (0.55, 1.03)	
West	743 (22.3)	622 (25.0)	0.75 (0.54, 1.05)	
Urban	2849 (85.9)	2297 (85.6)	0.89 (0.70, 1.12)	0.87
Perceived genetic susceptibility				0.02
very unlikely/unlikely/neither	1234 (40.3)	1212 (45.8)	Ref	
Had/Very likely/Likely	1960 (59.7)	1351 (54.2)	0.78 (0.63, 0.97)	
Cancer Worry				<.0001
not at all/slightly	1427 (48.6)	1264 (53.4)	Ref	
very/moderate/somewhat	1768 (51.4)	1302 (46.6)	1.17 (0.98, 1.40)	
Perceived progress of cancer treatment				0.0003
a little/almost none/do not know	1274 (41.2)	1237 (50.9)	Ref	
A lot/some	1908 (58.8)	1310 (49.1)	1.56 (1.30, 1.88)	
Perceived progress of cancer prevention				<.0001
a little/almost none/do not know	1013 (35.0)	1095 (45.4)	Ref	
A lot/some	2173 (65.0)	1448 (54.6)	0.98 (0.81, 1.19)	
Fatalistic belief				0.9402
Strongly agree/somewhat agrees	1714 (57.1)	1443 (57.3)	Ref	
somewhat disagree/strongly disagree	1473 (42.9)	1099 (42.7)	0.98 (0.81, 1.19)	
Prevention not possible				<.0001
somewhat disagree/strongly disagree	2448 (75.0)	1604 (62.3)	Ref	
Strongly agree/somewhat agrees	727 (25.0)	939 (37.7)	0.56 (0.45, 0.70)	
Too many recommendations				
somewhat disagree/strongly disagree	1126 (32.3)	723 (28.3)	Ref	0.04
Strongly agree/somewhat agrees	2059(67.6)	1811 (71.7)	0.78 (0.63, 0.97)	

**Figure 1.** Awareness of disease risk genetic testing by race/ethnicity group



**Figure 2.** Associated factors of awareness of disease risk genetic testing



**Table 2.** Adjusted odds ratios for associated factors of awareness of disease risk genetic testing among race/ethnicity groups, respectively

a. Among Hispanic participants				b. Among non-Hispanic White participants			
	aOR	95%CI			aOR	95%CI	
		Lower	Upper			Lower	Upper
College or above education (Ref: High school or below)	2.48	1.38	4.45	Age (Ref: 18-34)			
Insurance (Yes vs. No)	1.91	0.91	4.01	35-49	0.63	0.35	1.11
Having access to internet (No vs. Yes)	0.41	0.22	0.78	50-64	0.56	0.32	0.97
Urban Area (Ref: rural)	0.53	0.25	1.14	65-74	0.37	0.22	0.60
Perception				75+	0.17	0.10	0.30
Fatalistic belief (Strongly/somewhat disagree vs Strongly/somewhat agree)	1.99	1.22	3.24	Female (Ref: Male)	1.24	0.93	1.65
Cancer Worry (not at all/slightly vs. very/moderate/somewhat)	1.93	1.02	3.64	College or above education (Ref: High school or below)	1.33	0.92	1.94
Prevent not possible (Strongly/somewhat agree vs. Strongly/somewhat disagree)	0.73	0.44	1.21	Regular Provider visit (Yes vs. No)	1.74	1.05	2.89
Prevention not possible (Strongly/somewhat agree vs Strongly/somewhat disagree)	1.45	0.91	2.32	Having access to internet (No vs. Yes)	0.68	0.45	1.02
				Family Cancer History (Yes vs. No)	1.80	1.28	2.54
				Perception			
				Perceived genetic susceptible (A little or not at all vs. a lot or somewhat)	0.79	0.59	1.07
				Importance of genetics for cancer cure (A lot or somewhat vs. A little or not at all)	1.23	0.90	1.67
				Prevention not possible (Strongly/somewhat agree vs Strongly/somewhat disagree)	0.56	0.40	0.80
c. Among non-Hispanic African American participants				d. Among non-Hispanic AAPI participants			
	aOR	95%CI			aOR	95%CI	
		Lower	Upper			Lower	Upper
Having access to internet (No vs. Yes)	0.32	0.15	0.70	Having health insurance (Yes vs. No)	2.48	0.48	12.84
Family Cancer History (Yes vs. No)	1.77	1.04	3.02	Having access to internet (No vs. Yes)	0.11	0.00	5.95
College or above education (Ref: High school or below)	1.29	0.75	2.21	Region (Ref: Midwest)	2.32	0.36	15.18
Perception				Northeast	0.50	0.14	1.87
Importance of genetics for cancer cure (A lot or somewhat vs. A little or not at all)	1.67	0.96	2.92	South	1.22	0.28	5.39
Importance of genetics for cancer prevention (A lot or somewhat vs. A little or not at all)	1.70	0.92	3.13	West	0.40	0.15	1.03

Note: The risk factors of awareness of disease risk genetic testing among race/ethnic group, respectively, were selected via survey-weighted logistic regressions with stepwise model selection with same potential variable list. The potential variable list included age, gender, race, education level, income level, having health insurance, having regular provider, access to internet, family history of cancer, region, urban, perceived genetic susceptibility, cancer worry, perceived progress of cancer treatment and prevention, fatalistic belief, prevention not possible, too many recommendation. A significance level of 0.35 is required to allow a variable entry into and stay in the model.

Abbreviation: AAPI, Asian American and Pacific Islander; aOR, adjusted Odds ratio; DRGT, Disease Risk Genetic testing; OR, odds ratio; CI, Confidence Interval; Reference: . Loomans-Kropp, H. A., & Umar, A. (2019). Cancer prevention and screening: the next step in the era of precision medicine. NPJ precision oncology, 3(1), 3.