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“Don't Know” Responses to Risk Perception Measures: Implications for Underserved Populations

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Abstract

Background—Risk perceptions are legitimate targets for behavioral interventions because they can motivate medical decisions and health behaviors. However, some survey respondents may not know (or may not indicate) their risk perceptions. The scope of “don't know” (DK) responding is unknown.

Objective—Examine the prevalence and correlates of responding DK to items assessing perceived risk of colorectal cancer.

Methods—Two nationally representative, population-based, cross-sectional surveys (2005 National Health Interview Survey [NHIS]; 2005 Health Information National Trends Survey [HINTS]), and one primary care clinic-based survey comprised of individuals from low-income communities. Analyses included 31,202 (NHIS), 1,937 (HINTS), and 769 (clinic) individuals.

Measures—Five items assessed perceived risk of colorectal cancer. Four of the items differed in format and/or response scale: comparative risk (NHIS, HINTS); absolute risk (HINTS, clinic), and “likelihood” and “chance” response scales (clinic). Only the clinic-based survey included an explicit DK response option.

Results—“Don't know” responding was 6.9% (NHIS), 7.5% (HINTS-comparative), and 8.7% (HINTS-absolute). “Don't know” responding was 49.1% and 69.3% for the “chance” and “likely” response options (clinic). Correlates of DK responding were characteristics generally associated with disparities (e.g., low education), but the pattern of results varied among samples, question formats, and response scales.

Limitations—The surveys were developed independently and employed different methodologies and items. Consequently, the results were not directly comparable. There may be multiple explanations for differences in the magnitude and characteristics of DK responding.

Conclusions—“Don't know” responding is more prevalent in populations affected by health disparities. Either not assessing or not analyzing DK responses could further disenfranchise these populations and negatively affect the validity of research and the efficacy of interventions seeking to eliminate health disparities.

Keywords

Risk perception; measurement; colorectal cancer; item response; disparities

Most health behavior theories identify perceived risk as a central precursor of people's engagement in healthy behaviors.¹ This premise has received extensive empirical support in the context of skin, breast, and colon cancer prevention.²⁻⁴ As research identifies new cancer risk factors (e.g., genomics), there are also increased opportunities for motivating primary and secondary cancer prevention by enhancing personal cancer risk awareness.

This paper explores the possibility that some portion of the population may not have, may not be able to articulate, or may not be willing to articulate a risk perception for a given health problem. We accomplish this by examining the prevalence of responding, "I don't know," when asked about one's risk for colorectal cancer (i.e., "don't know" [DK] responding). There are multiple possible reasons for DK responding, including inadequate knowledge and insufficient motivation to respond.⁵ One important consequence of DK responding might be a lack of recognition of the importance of engaging in appropriate cancer prevention and detection behaviors.⁶

Not knowing and/or not articulating one's perceived risk judgment may be relatively common. Lipkus examined perceived risk for colorectal cancer in a community sample of African-American primary care patients. When presented with a verbal likelihood scale, 38% of participants endorsed the DK response option.⁷ When a DK response option is unavailable, participants may not provide a response at all. In response to a survey of individuals with a family history of colorectal cancer, 20% did not answer a percent likelihood question regarding colorectal cancer risk.⁸ "Don't know" responding has also been discovered in domains unrelated to cancer, such as risk perceptions for heart disease.⁹ Although some methodological or statistical approaches to minimize DK responding have been explored,¹⁰ the predominant approach has been to treat DK responses as missing data. This results in systematic exclusion from statistical analysis of people who respond in this way.

Studying those who report that they don't know their cancer risk is important for theoretical, practical, and ethical public health considerations. First, it is important to identify how uncertainty affects interpretation of cancer risk messages and engagement in cancer prevention and detection behaviors. One study reported that believing that colorectal cancer screening recommendations were ambiguous was associated with nonadherence to those recommendations.¹¹ However, the implications of this finding for DK responding are unclear, because perceived ambiguity of recommendations might be different from ignorance of one's risk and/or screening recommendations. Second, people who are unaware of their risk may require a unique intervention approach for motivating them to change their behavior.⁶ Third, people who report that they don't know their cancer risk may be at heightened risk for having less knowledge about cancer prevention recommendations. Because people who have less formal education, are members of minority racial and ethnic groups, and have lower incomes tend to also have lower levels of knowledge about health issues compared to white and more educated individuals,¹² it is reasonable to conclude that DK responding may be more prevalent among those populations. Finally, if the development phases of risk communication interventions treat DK responses as missing data, the communication needs of individuals who respond DK may not be represented adequately in subsequent health behavior research or interventions.

This study examines the prevalence and demographic correlates of DK responses to questions assessing perceived risk of colorectal cancer, which is a serious public health problem.¹³ To gain a more complete understanding of the DK response phenomenon,¹⁴ we utilized two large, diverse, nationally representative surveys and a large clinic-based survey. Because variations in the way a survey question or response scale is structured can affect responding,¹⁵ we also examine DK responding to risk perception questions that are diverse in wording and response formats.

METHODS

Data Sources and Participants

Data were obtained from the 2005 iteration of the National Health Interview Survey (NHIS 2005) and the 2005 iteration of the Health Information National Trends Survey (HINTS 2005). NHIS and HINTS are population-based, nationally representative surveys of the civilian noninstitutionalized population of the United States.^{16,17}

To begin exploring the effects of including an explicit DK option in a sample that would potentially have low health literacy, data were also obtained from a survey originally conducted as a part of a clinic-based study of colorectal cancer risk beliefs and adherence with colorectal cancer screening.¹⁸ For that study, potential participants were approached in the clinic waiting room at Queens Hospital Center (QHC) Ambulatory Care Center in Jamaica, New York. The hospital serves a local patient population that is highly multiethnic, and the hospital has a strong focus on reaching recent immigrant and other underserved communities who may be under-represented among population-based surveys despite oversampling efforts by those surveys. Insurance status at QHC is very diverse, with 22% uninsured, and a large percentage (32%) in a Medicaid Managed Care Plan. Interested participants completed a 40-minute questionnaire with the aid of a research study assistant. The response rate was 33%. Nonresponse did not vary by sex, which was the only demographic characteristic collected from nonresponders.

Participants were included in the analyses if they were 18 years of age or older, did not report a personal history of colorectal cancer, had been asked about their perceived risk of developing colorectal cancer, and had provided any response to the risk question (i.e., including DK but not including those who refused to answer or those for whom the question was not ascertained [NHIS]). Participants from NHIS and the clinic sample who were between 18 and 50 years of age were included. Although screening recommendations for colorectal cancer begin at age 50 for the average risk population, being below age 50 does not mean that one does not potentially have a perception of risk for colorectal cancer; the construct is applicable regardless of age. In accordance with the HINTS survey design, the HINTS sample included only participants aged 45 and older. In addition, the HINTS colorectal cancer module was administered to only one-third of the total sample. Thus, the entire sample included 31,202 people who participated in NHIS, 1,937 people from HINTS, and 769 participants from the clinic sample. Of those individuals, 26,666 people from NHIS (85.4% of all eligible respondents), 1,783 from HINTS (92.1% of all eligible respondents), and 581 from the clinic (75.6% of all eligible respondents) provided valid responses for all of the items of interest and were included in the multivariate analyses.

MEASURES

Perceived risk of colorectal cancer—The 3 surveys assessed different types of perceived risk. NHIS and HINTS both assessed comparative risk perceptions using a 3-point scale: “Compared to the average [man/woman] your age, would you say that you are more likely to get colon or rectal cancer, less likely, or about as likely?” HINTS also assessed

perceived absolute risk, but with a 5-point scale: “How likely do you think it is that you will develop colon cancer in the future? Would you say your chance of getting colon cancer is (1) very low – (5) very high?” The clinic sample assessed absolute risk using a 3-point scale that framed risk as likelihood: “Do you think you are likely to get colorectal cancer or unlikely to get it? (1) likely; (2) unlikely; (3) no idea.” The clinic also framed absolute risk as chance, using an 8-point scale: “What is the chance you will develop colorectal cancer in the future? (1) no chance – (7) certain to happen; (8) no idea.”

Responses were recoded to represent whether participants did (1) or did not (0) provide a DK response. NHIS and HINTS did not provide an explicit DK option. Instead, the category was marked only if participants proactively stated that they did not know.

Demographic variables—Ten demographic variables were included in the analyses: age, sex, race, ethnicity, educational attainment, income, marital status, U.S. nativity, years in the U.S., and the ability to speak any language other than English. Language spoken was unavailable for HINTS participants.

Health access and health history—Insurance status and family history of colorectal cancer were also assessed. Insurance status was not available for the clinic sample.

Statistical Analyses

Data were analyzed separately for each of the surveys using SUDAAN (NHIS), STATA (HINTS), and SPSS (clinic). The NHIS and HINTS analyses were conducted using weighted data to yield estimates representative of the U.S. population. Participant characteristics were examined using descriptive statistical techniques. Income was not examined for the HINTS participants because it was missing for 25% of the sample. Chi-square tests were used to examine whether there were bivariate relationships between responding DK and any of the predictor variables. Next, five multivariate logistic regressions were conducted (i.e., one for each type of perceived risk in each survey). In each case, the dichotomous DK variable was the outcome. The predictors were the demographic, health access, and health history variables that were significantly ($P < 0.05$) related to responding DK in any of the surveys. Having a family history of colorectal cancer was also included in the models because people with a family history may have greater knowledge of colorectal cancer risk factors than people without a family history.

RESULTS

Participant Characteristics

Participant characteristics for each dataset are presented in Table 1. As expected, the demographic characteristics of participants from the NHIS and HINTS surveys were comparable to those seen in the general U.S. population. The clinic sample, however, was comprised disproportionately of individuals who identified as being black ($n = 378$, 52.1%), were not born in the U.S. ($n = 593$, 79.5%), had never been married ($n = 197$, 26.5%) or were divorced ($n = 133$, 17.9%), had not obtained a high school degree or equivalent ($n = 277$, 37.4%), and had a household income of less than \$30,000 ($n = 473$, 76.8%).

Prevalence of Responding Don't Know (DK)

More than 6% of participants in all 3 surveys provided a DK response to at least one risk question, although the exact proportion varied by type of question and by sample. The population-based surveys indicated that 6.9% (weighted, $n = 2,190$), 7.5% (weighted, $n = 148$), and 8.7% (weighted, $n = 157$) of the population responded DK to the NHIS comparative risk, HINTS comparative risk, and HINTS absolute risk questions, respectively.

The picture was much different among clinic respondents, for whom DK responding comprised 49.1% ($n = 377$) of answers to the chance response option and 69.3% ($n = 533$) of answers to the likelihood response option.

Demographic Correlates of Responding Don't Know (DK)

As seen in Table 2, the multivariate analyses indicated that predictors of DK responding differed by both type of question and survey population. Older age was associated with higher odds of DK responding in NHIS and for the comparative risk HINTS question, but not for the HINTS absolute risk question or for the questions in the clinic sample. Having lower educational attainment was associated with higher odds of DK responding in NHIS and for the likelihood question in the clinic sample, but not for the chance question (clinic) or either HINTS question. Being divorced (rather than never married) or married (rather than never married) was associated with lower odds of DK responding in the NHIS and clinic samples. Having a family history of colorectal cancer was also associated with lower odds of DK responding for the NHIS sample and the chance question for the clinic sample, but not for the likelihood question (clinic sample) or the HINTS questions. Being male was associated with lower odds of DK responding only for the clinic sample. Being born outside the U.S. was associated with increased odds of DK responding only for NHIS and the HINTS absolute risk question. Several associations were statistically significant only for the NHIS sample. The odds of DK responding were higher among participants who reported black or "other" race (compared to being white), or reported income as a broad range (e.g., > \$20,000) rather than a more specific category (e.g., \$25,000–\$35,000).

Examining the direction of the associations between participant characteristics and DK responding offers a clearer view than attending only to statistical significance. Of the 11 variables examined in the multivariate analyses, the odds ratios were: in the same direction across *all* surveys and question types for 4 variables (age, ethnicity, U.S. nativity, language spoken); in the same direction across *most* surveys and question types for variables (sex, education, family history of colorectal cancer); and were *mixed* across surveys and question types for 4 variables (race, marital status, insurance status, income). Table 3 summarizes the overall consistency, direction, and statistical significance of the findings.

DISCUSSION

These results illustrate 3 important findings about DK responding. First, a non-trivial proportion of survey respondents indicated they did not know their risk for colorectal cancer even when no explicit DK option was provided. In both of the nationally representative samples (NHIS, HINTS), 7% to 9% of individuals provided a DK response. This represents several hundred respondents in each sample and over two million American adults. Second, comparing rates of DK responding in the datasets with (clinic) and without (HINTS, NHIS) explicit DK response options suggests that surveys that do not provide a DK option may significantly underestimate the number of individuals who do not know or who are not willing/able to articulate their perceived risk of colorectal cancer.

Third, DK responding was associated with a commonly observed pattern of respondent characteristics. In the most highly-powered sample (NHIS), characteristics associated with health disparities (e.g., black race, being an immigrant, having less than a college degree) were associated with significantly more DK responding, as was older age. With the exception of race in the clinic dataset (a disproportionately immigrant, very low income sample), the results were similar for the HINTS and clinic samples. However, only two of these effects were statistically significant.

Potential Explanations for DK Responding

There are multiple reasons why individuals might provide a DK response to a risk perception item. One possibility is “true” DK responding, in which participants lack knowledge of risk factors or disease prevalence. True DK responding may be relatively common for risk perception questions, because risk information is particularly challenging to process and apply.¹⁹ There is ample evidence that most individuals, including highly educated individuals, have difficulty understanding and applying probabilities and other numerical health risk information.^{20,21} Alternatively, people may have knowledge or perceptions related to their risk, but may not want to share that perception.²² Accordingly, they may respond DK out of embarrassment, because they perceive that their knowledge does not meet the accuracy requirements for the question, or because they do not trust the confidentiality of their responses. People may also lack the motivation to expend the cognitive and emotional effort necessary to formulate a response.²² The study reported here does not directly examine which of these explanations best accounts for the patterns of DK responses. Nevertheless, all have important and unique implications for our understanding of risk perception and for survey methodologies to assess risk. Additional research is clearly needed.

DK Responding and Health Disparities

Several possible explanations also exist for the disproportionate use of the DK response among sociodemographic groups that also experience health disparities. In part, DK responding may reflect low health literacy, which is more prevalent in low socioeconomic status, minority, and immigrant populations.^{23,24} Low health literacy encompasses difficulty acquiring, processing, and applying health knowledge to promote health.²⁵ It is associated with a variety of negative outcomes including higher all-cause mortality.²⁶ Thus, DK responding to risk perception items may represent a marker for a group of individuals who possesses not only less cancer knowledge, but also fewer skills to seek out, process, and apply health information. Research that seeks to understand individuals who respond DK to items assessing perceived risk and other health beliefs may also facilitate understanding those populations who are most vulnerable to poor health outcomes.

The availability of exemplars (individuals who have experienced the health hazard in question) can also influence risk perceptions.^{27,28} However, culturally based variation in openness of communication about cancer,^{29,30} the historic absence of culturally appropriate health messaging, and the lack of publicized examples of cancer patients who are people of color, immigrants, and have lower socioeconomic status^{31,32} may limit the availability of exemplars for vulnerable populations. Consequently, the likelihood of a DK response might be increased differentially in those groups, which would account for part of the relationship between respondent characteristics and DK responding.

It could also be that certain worldviews and beliefs (e.g., that a higher power has ultimate control, that it's important to avoid “tempting fate”)^{33,34} may lead to DK responding when a respondent's view of the meaning of risk and risk appraisal differs from survey items generated based on a western socio-medical conceptualization of risk.¹⁸ These beliefs could lead to disproportionate DK responding because they may be disproportionately represented among racial/ethnic minorities and the poor.

Methodological Implications of DK Responding

In the only study in which a DK response option was explicitly provided (clinic), DK response rates were at least 40 percentage points higher than in the datasets where DK was recorded only if a participant stated DK even after being encouraged to select an alternative response (HINTS, NHIS).¹⁶ Although there are important geographic (local vs. national),

demographic (e.g., immigrant vs. U.S. native-born), socioeconomic (lower vs. higher), and methodological (e.g., convenience vs. nationally representative sample) differences between the samples, it is clear from the above discussion on health disparities that this substantial difference is unlikely to be due entirely to design differences. Models of survey response (e.g., Tourangeau and others³⁵), which describe how individuals attempt to map their “mental answer” onto a response option, lend credence to the idea that studies that do not provide DK responses underestimate the proportion of the population who are unaware of or are not inclined to indicate their risk perceptions.

If individuals truly do not know or do not want to indicate their risk, but face a survey item that requires an estimate, they may: 1) skip the item; 2) answer DK even though it is not a response option; 3) guess at random among the available response options; or 4) systematically select a particular response option that they believe maps to DK (e.g., Bruine de Bruin and Carman³⁶). These actions could undermine a study's validity and reliability by leading to biased estimates of the mean, wider confidence intervals, decreased power to detect an effect, and incorrect conclusions about the magnitude of perceived risk and its relation to behavior. Treating DK responses as missing data in statistical analyses may have the same effects.

An alternative possibility is that excluding a DK response option may force respondents to choose the option closest to their intuitive or gut reactions. Because intuition can provide people with information about a situation that is not conveyed via more systematic examination, it is possible that forcing people to choose a “valid” non-DK response option provides a more accurate picture of their perceptions. This possibility deserves careful empirical study.

Limitations and Future Directions

The data used in this study were drawn from three unrelated projects that were designed and executed independently. This resulted in each sample having its own unique set of methodological features, strengths, and weaknesses. For reasons discussed previously, it is unlikely that differences in study design explain our findings completely. Nevertheless, studies designed a priori to test the influence of these differences (e.g., systematically including/excluding a DK option, varying operationalizations of perceived risk) are necessary.

It is also important to note that the risk perceptions examined here are risk perceptions about colorectal cancer, but the public's knowledge about colorectal cancer is limited.³⁷ Although substantial DK responding was found in a study related to heart disease (i.e., 25% of the sample), future work should examine the extent to which the findings here generalize across health hazards.

Research should also investigate whether DK responding predicts differential engagement in future prevention and screening behaviors. Regardless of insurance status, lower rates of colorectal cancer screening are found in the same groups that showed disproportionate rates of DK responses: people with lower education, who had immigrated to the US, and who are African American or black.³⁹ Determining whether providing an explicit DK response option helps identify individuals that would benefit from interventions to promote screening and other prevention behaviors would be useful.

More minor concerns also exist. For example, perceptions of risk were assessed with single items. Future research should include multiple items and types of perceived risk (e.g., verbal versus numerical). Another concern is that the clinic response rate was only 33%. However, it is consistent with other clinic-based research involving underserved populations.³⁸

Finally, the datasets used for this study do not allow us to directly examine other interesting questions, such as whether adding a DK option increases or decreases the item's validity and reliability, whether forcing a response by not offering a DK option prompts respondents to choose the option that is most consistent with their intuitions, or which of the plausible accounts for DK responding best explains the results. Future work should examine these questions by focusing on the psychological processes driving DK responding. For example, to what extent is DK responding to perceived risk items attributable to lack of motivation, lack of knowledge, and differences in worldview? Examining DK responding to items that assess intuitions of risk or vulnerability (e.g., feelings of risk, at risk/not at risk), as well as the possibility that people who do not know their risk may utilize other health cognitions (e.g., perceived severity, worry) or their intuitions to formulate their answer would also be informative.

Conclusion

These data have important implications for health behavior and decision making research. Classic health decision making models assume that perceived risk is a key driver of behavioral decision making.¹ More recent models positing that individuals construct their risk perceptions in real time⁴⁰ also make this assumption. That a nontrivial portion of the population is either unaware of or is not inclined to indicate their perceived risk calls this centrality into question. Thus, these findings suggest that we may need to reconsider how perceived risk functions and under what circumstances risk influences health-related decisions and behaviors.

Beyond theoretical concerns, the relationship between participant characteristics and DK responding has profound implications for social justice in health. Failure to provide a DK response option and analyze its data may result in a disproportionate exclusion of responses of those individuals for whom health disparities exist. This conflicts with the value of ensuring all members of society have the ability to participate in and benefit from research. Also of concern is the potential that incorrect conclusions from research without information about DK responders might obstruct the effort toward eliminating health disparities in the United States.

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Table 1**Demographic and Health Status Characteristics of 3 Independent Samples**

	NHIS 2005 <i>n</i> (valid weighted %) or M (SE)	Clinic <i>n</i> (valid %) or M (SE)	HINTS 2005 <i>n</i> (valid weighted %) or M (SE)
Age, mean (SE)	45.4 (0.1)	56.4 (0.4)	45.5 (0.6)
Sex			
Female	17,538 (51.8%)	430 (55.9%)	1256 (52.0%)
Male	13,664 (48.2%)	339 (44.1%)	679 (48.0%)
Race			
White	25,214 (82.9%)	43 (5.9%)	1549 (80.7%)
Asian	980 (3.8%)	120 (16.5%)	31 (2.6%)
Black	4,382 (11.4%)	378 (52.1%)	160 (11.0%)
Other	626 (2.0%)	185 (25.5%)	77 (5.7%)
Ethnicity			
Hispanic	5,485 (12.8%)	67 (9.1%)	158 (13.1%)
Not Hispanic	25,717 (87.2%)	672 (90.9%)	1717 (86.9%)
U.S. nativity			
Yes	25,608 (84.3%)	153 (20.5%)	1682 (84.7%)
No	5,567 (15.7%)	593 (79.5%)	200 (15.3%)
Years in the United States ^a		16.3 (0.48)	19.3 (1.26)
< 1 year	90 (1.6%)		
1 – 5 years	592 (10.6%)		
5 – 10 years	951 (18.5%)		
10 – 15 years	704 (13.3%)		
15 + years	3117 (55.9%)		
Marital status			
Married/cohabitating	16,276 (63.2%)	353 (47.4%)	1097 (63.5%)
Never married	6,566 (19.9%)	197 (26.5%)	271 (20.9%)
Divorced/separated	5,176 (10.7%)	133 (17.9%)	254 (9.4%)
Widowed	3,020 (6.2%)	61 (8.2%)	258 (6.2%)
Education			
Less than high school	5,745 (22.2%)	277 (37.4%)	247 (15.7%)
High school or GED	846 (3.7%)	224 (30.2%)	510 (27.7%)
Some college	5,710 (25.5%)	90 (12.1%)	520 (32.1%)
4-year college degree or more	10,542 (48.6%)	150 (20.2%)	599 (24.5%)
Health insurance status			
Yes	24,727 (80.4%)	Not assessed	1671 (83.8%)
No	6,465 (19.6%)	Not assessed	210 (16.2%)
Family history of colorectal cancer			
Yes	1,505 (4.6%)	49 (6.6%)	222 (9.9%)
No (No, DK)	29,697 (95.4%)	696 (93.4%)	1713 (90.1%)
Language spoken			

	NHIS 2005 <i>n</i> (valid weighted %) or M (SE)	Clinic <i>n</i> (valid %) or M (SE)	HINTS 2005 <i>n</i> (valid weighted %) or M (SE)
English only	21742 (76.8%)	544 (74.2%)	
Some Spanish/other	8075 (23.3%)	189 (25.8%)	
Household income (NHIS/Clinic/HINTS)			
<10 K	2415 (5.4%)	227 (36.9%)	
10–25 K/10–29 K/<25K	5585 (14.8%)	246 (39.9%)	466 (26.1%)
25–35 K/30–49 K/25–35K	3032 (9.3%)	99 (16.1%)	173 (9.2%)
35–55 K/50–69 K/35–50K	4662 (16.0%)	25 (4.1%)	226 (13.7%)
55–75 K/70–89 K/50–75K	2907 (11.5%)	8 (1.3%)	321 (21.0%)
75 K+/90 K+>75K	5413 (24.6%)	11 (1.8%)	417 (30.0%)
>20 K	3657 (14.3%)		
<20 K	1543 (4.1%)		

Note. Includes participants who were 18 years of age or older, did not report a personal history of colorectal cancer, had been asked about their perceived risk of developing colorectal cancer, and provided any response to the risk question. The clinic sample was not weighted to the population because it was not designed to be a nationally representative, population-based survey.

^aYears in the United States was asked only of individuals who had not been born in the United States. NHIS measured Years in the United States with a close-ended categorical response scale, whereas the clinic and HINTS samples assessed it with a continuous scale.

Table 2

Multivariate Analysis of Characteristics Associated with “Don't Know” Responses

Characteristics	Survey Name (Type of Perceived Risk) Frequency (%) of “Don't Know” Responses					
	NHIS (Comparative) N = 26,666		HINTS (Comparative) N = 1,783		Clinic (Likelihood) N = 581	
	OR	95% CI	OR	95% CI	OR	95% CI
Age	1.02	1.01, 1.02	1.02	1.01, 1.04	1.01	.99, 1.03
Sex						
Male	1.06	.93, 1.20	0.72	.44, 1.18	0.63	.43, .92
Female	-	-	-	-	-	-
Race						
White	-	-	-	-	-	-
Black	1.30	1.10, 1.53	1.22	.44, 3.36	0.82	.37, 1.85
Asian	1.35	.90, 2.05	1.35	.38, 4.74	0.94	.38, 2.33
Other	1.64	1.16, 2.32	0.86	.34, 2.18	0.74	.32, 1.75
Ethnicity						
Hispanic	1.07	.82, 1.39	1.36	0.64, 2.92	1.30	.65, 2.60
Non-Hispanic	-	-	-	-	-	-
U.S. nativity						
Yes	-	-	-	-	-	-
No	1.69	1.34, 2.13	1.59	.87, 2.92	1.19	.73, 1.94
Marital status						
Married	0.70	.58, .86	0.81	.38, 1.73	0.93	.57, 1.52
Divorced	0.76	.61, .95	0.81	.31, 2.09	0.5	.29, .88
Widow(er)	0.96	.76, 1.21	1.11	.42, 2.89	0.74	.33, 1.66
Never	-	-	-	-	-	-
Education						
< high school	2.02	1.67, 2.44	1.25	.62, 2.52	1.3	.74, 2.26
High school only	1.86	1.59, 2.18	1.53	.83, 2.81	2.02	1.14, 3.57
Some college	1.37	1.11, 1.69	1.37	.74, 2.53	1.34	.70, 2.52
College degree	-	-	-	-	-	-
Health insurance status						
No	1.10	.93, 1.30	0.91	.42, 1.98		
Yes	-	-	-	-		
Family history of colorectal cancer						
Yes	0.74	.57, .97	1.51	.62, 3.69	0.53	.25, 1.11
No	-	-	-	-	-	-
Language spoken						
English only	-	-			-	-
Some Spanish	0.93	.78, 1.10			0.99	.61, 1.60
Household income						
<10 K	1.20	.91, 1.60			0.79	.17, 3.56
10–25 K/10–29 K	1.23	.97, 1.56			0.67	.15, 3.00

Characteristics	Survey Name (Type of Perceived Risk) Frequency (%) of "Don't Know" Responses					
	NHIS (Comparative) N = 26,666		HINTS (Comparative) N = 1,783		Clinic (Likelihood) N = 581	
	OR	95% CI	OR	95% CI	OR	95% CI
25–35 K/30–49 K	1.04	.78, 1.38			0.21	.02, 1.88
35–55 K/50–69 K	0.93	.73, 1.18			1.27	.22, 7.20
55–75 K/70–89 K	1.01	.77, 1.33			2.95	.22, 39.37
75 K+/90+ K	-	-			-	-
>20 K	1.81	1.43, 2.27				
<20 K	1.58	1.17, 2.13				

Characteristics	Survey Name (Type of Perceived Risk) Frequency (%) of "Don't Know" Responses			
	HINTS (Absolute) N = 1,783		Clinic (Chance) N = 581	
	OR	95% CI	OR	95% CI
Age	1.01	.99, 1.02	1.01	0.99, 1.03
Sex				
Male	0.70	.44, 1.13	0.6	.42, .87
Female	-	-	-	-
Race				
White	-	-	-	-
Black	1.69	.68, 4.20	0.69	.32, 1.51
Asian	1.62	.49, 5.35	0.81	.34, 1.93
Other	1.79	.74, 4.32	0.54	.24, 1.23
Ethnicity				
Hispanic	1.41	.50, 3.97	1.29	.68, 2.44
Non-Hispanic	-	-	-	-
U.S. nativity				
Yes	-	-	-	-
No	2.73	1.14, 6.55	1.01	.63, 1.61
Marital status				
Married	0.96	.46, 1.98	0.94	.60, 1.47
Divorced	1.44	.60, 3.47	0.54	.31, .93
Widow(er)	1.23	.45, 3.37	1.92	.88, 4.17
Never	-	-	-	-
Education				
< high school	0.97	.45, 2.08	1.35	.78, 2.33
High school only	1.53	.85, 2.75	1.34	.78, 2.30
Some college	1.43	.78, 2.62	1.41	.75, 2.65
College degree	-	-	-	-
Health insurance status				
No	0.92	.44, 1.92		
Yes	-	-		
Family history of colorectal cancer				
Yes	0.75	.32, 1.76	0.37	.17, .84

Survey Name (Type of Perceived Risk) Frequency (%) of "Don't Know" Responses

Characteristics	HINTS (Absolute) N = 1,783		Clinic (Chance) N = 581	
	OR	95% CI	OR	95% CI
No	-	-	-	-
Language spoken				
English only			-	-
Some Spanish			0.67	.42, 1.07
Household income				
<10 K			1.29	.29, 5.79
10–25 K/10–29 K			1.23	.28, 5.46
25–35 K/30–49 K			1.7	.35, 8.24
35–55 K/50–69 K			1.49	.28, 8.06
55–75 K/70–89 K			0.86	.11, 7.03
75 K+/90+ K			-	-
>20 K				
<20 K				

Note. Odds ratios (OR) and confidence intervals (CI) are adjusted for all the variables in the model, which includes only respondents who did not have missing data on any of the predictor variables.

Table 3

Overall Summary of Findings

Characteristics	Interpretation (More DK Responses Associated with...)	Consistency (Number of Findings in the Same Direction) ^a	Number of Significant Odds Ratios (ORs)
Age	Older age	5	2
Sex	Female	4	2
Race (ref = White)	Black	3	1
	Asian	3	0
Ethnicity	Hispanic	5	0
U.S. nativity	Non-native	5	2
Marital status (ref = Never married)	Married ^b	5	1
	Divorced ^b	4	3
Educational attainment (ref = College degree)	< High school	4	1
	High school	5	2
	Some college	5	1
Insurance status	Insured	2 ^a	0
Family history of colorectal cancer	No family history	4	2
Language spoken	English only speaker	3 ^a	0
Household income	Lower income	^a	^a

Note: DK = "Don't Know."

^aWith the exception of insurance status and language spoken, all characteristics were examined across all question types and samples. Consequently, whereas most characteristics are represented by 5 ORs, there were only 3 ORs for insurance status and language spoken. Household income was operationalized quite differently across samples, and was not included in the HINTS analysis. See Table 2 for details.

^bBeing married or divorced is associated with fewer DK responses than being never married.