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Perceptions of Cancer Controllability and Cancer Risk Knowledge: The Moderating Role of Race, Ethnicity, and Acculturation

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Abstract

Literature suggests racial/ethnic minorities, particularly those who are less-acculturated, have stronger fatalistic attitudes toward cancer than do non-Latino Whites. Knowledge of cancer prevention is also lower among racial/ethnic minorities. Moreover, low knowledge about cancer risk factors is often associated with fatalistic beliefs. Our study examined fatalism and cancer knowledge by race/ethnicity and explored whether race/ethnicity moderate the association of fatalism with knowledge of cancer prevention and risk factors. We analyzed data from the Health Information National Trends Survey (2008), a national probability survey, to calculate population estimates of the associations among race/ethnicity, fatalistic beliefs, and knowledge about cancer

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from multivariable logistic regression. Racial/ethnic minorities had higher odds of holding fatalistic beliefs and lower odds of having knowledge of cancer risk factors than non-Hispanic Whites, and important differences by acculturation among Latinos were observed. Limited evidence of the moderating effect of race/ethnicity on the relationship between fatalistic beliefs and cancer risk factor knowledge was observed. Knowledge of cancer risk factors is low among all race/ethnicities, while fatalistic beliefs about cancer are higher among racial/ethnic minorities compared with non-Hispanic Whites. Implications for cancer education efforts are discussed.

Keywords

Cancer fatalism; Health communication; Disparities; Communication inequalities

Introduction

Fatalistic beliefs about cancer, that is, beliefs about cancer causes and controllability, have been associated with behavior and determinants of behavior including knowledge, self-efficacy, and perceived control [18,25]. Fatalistic beliefs about cancer and knowledge about cancer causes are thought to be differentially distributed among subsets of the US population, making it particularly important for cancer education efforts to be informed by an understanding of how these beliefs interact with race and ethnicity to affect knowledge about cancer risk factors and recommendations for cancer prevention.

The public's understanding of illness has been theorized to have important implications for cancer prevention behaviors [4]. The *Common-Sense Model of Health and Illness Self-Regulation* asserts that individuals' illness representations influence coping ability, health behaviors, and health outcomes. Specifically, beliefs about prevention, early detection, or treatment offer insight into individuals' perceptions of control over factors that affect their health and may influence health behavior and outcomes [4].

In the cancer context, fatalism is often conceptualized as having a perception that developing cancer is outside of one's control [22], moreover, that death is inevitable [20]. Fatalistic beliefs are likely to inhibit regulatory action around disease prevention, detection, and treatment, by decreasing self-efficacy and perceived behavioral control [18]. Evidence suggests that fatalistic beliefs discourage people from engaging in health behaviors including preventive behaviors [18] and cancer screening [7]. Additionally, the empirical literature suggests that racial/ethnic minorities, and particularly those who are less-acculturated, have stronger fatalistic attitudes about cancer than do non-Latino Whites. For example, Latinas have higher levels of fatalistic beliefs about cancer causes and controllability compared with women of other races/ethnicities [6], and other studies have demonstrated that African-Americans [24] also have high levels of fatalistic beliefs about cancer. Most studies that have examined fatalism have specifically focused on convenience samples of racial/ethnic minorities and the poor [20]. Additionally, with two known exceptions [18]; [23], none of these studies has used nationally representative data to get population estimates of these beliefs by race/ethnicity.

Our study expands upon previous research by using nationally representative data to examine the following research questions:

RQ1. Are racial/ethnic minorities and non-Latino Whites equally likely to hold fatalistic beliefs about cancer?

RQ2. Are racial/ethnic minorities and non-Latino whites equally likely to have knowledge about cancer risk factors?

Additionally, we sought to understand the extent to which race/ethnicity moderate the effects of fatalism on knowledge about cancer.

RQ3. Does the relationship between fatalistic beliefs and knowledge vary by race/ethnicity?

Methods

Data Collection

We utilized data from the 2008 Health Information National Trends Survey (HINTS). Data were collected using a mixed mode, dual-frame design (*n*=7,674) including a list-assisted Random Digit Dial frame (*n*=4,092 adults) and a U.S. Postal Service (USPS) mail frame (3,582). Phone interviews were conducted in English or Spanish by trained interviewers. This component had a response rate of 42.4 % for the household screener and 57.2 % for the extended interview. The stratified cluster sample for the mail frame oversampled for minorities and was drawn from a national listing of addresses available from the USPS. The household response rate for this component was 40 %, and the within-household response rate was 77.4 %. Details on the study design have been published elsewhere [5].

Measures

Key messages around cancer prevention and control emphasize the importance of lifestyle choices and health behavior including physical activity, healthy diet (fruit and vegetable intake), and cancer screening [12]. HINTS provides an opportunity to explore public knowledge of cancer prevention behaviors and relevant risks.

Knowledge of Association Between Physical Activity and Cancer Risk—

Respondents' knowledge of the link between physical activity and cancer risk was assessed with the following item: "As far as you know, does physical activity or exercise increase the chances of getting some types of cancer, decrease the chances of getting some types of cancer, or does it not make much difference?" Responses to this item were coded as correct (1, "decrease the chances of getting some types of cancer") or incorrect (0, "increase the chances of getting some types of cancer," "it does not make much difference," and "don't know").

Knowledge About Recommendations for Physical Activity for Health—

Respondents' knowledge of physical activity recommendations were assessed with the following item: (1) "How many days a week of physical activity or exercise are recommended for the average adult to stay healthy? and (2) "On those days, how long should the average adult be physically active to stay healthy?" Responses to these items were open-ended, and a dichotomous variable was constructed. Correct knowledge (=1) of the moderate-intensity of physical activity recommendation was defined as correctly identifying both duration (at least 30 min) and frequency (5–7 days per week), following

CDC recommendations at the time of data collection [3, 11, 19]. All other responses were coded incorrect (=0).

Knowledge About Recommendations for Fruit and Vegetable Consumption for Health—The following free-response question assessed respondents' knowledge of fruit and vegetable recommendations: "How many servings of fruits and vegetables do you think a person should eat each day for good health?" Responses were recoded into a dichotomous variable to reflect federal guidelines [13] at the time of data collection (five or more servings of fruits and vegetables per day) such that: 0–4 was coded as incorrect (=0) and 5 or more coded as correct (=1).

Knowledge About HPV as a Cause of Cervical Cancer—All respondents were asked: "Have you ever heard of HPV? HPV stands for Human Papillomavirus. It is not HIV, HSV, or herpes." Respondents who answered "yes" (n=4,912) were then asked: "Do you think HPV can cause cervical cancer?" Responses were dichotomized: "no" and "don't know" (=0) versus "yes" (=1).

Beliefs About Cancer Causes and Preventability—Respondents were asked to indicate the extent to which they agreed with several beliefs about cancer causes and preventability: "Cancer is most often caused by a person's behavior or lifestyle."; "It seems like everything causes cancer."; "There's not much you can do to lower your chances of getting cancer."; and "There are so many different recommendations about preventing cancer, it's hard to know which ones to follow." Response options for these questions were: "strongly agree," "somewhat agree," "somewhat disagree," "strongly disagree," and "don't know." For our analysis, "don't know" responses were treated as missing, and the "strongly/somewhat" responses were combined for each item, resulting in four unique dichotomous variables indicating agreement or disagreement with each statement.

Sociodemographic Characteristics—The following sociodemographic variables were assessed and included in our analyses: age, gender, education, and race/ethnicity. Age was categorized as follows: 18–34, 35–49, 50–64, and 65 years and older. Level of education was categorized as: less than high school, high school graduate, some college, and college graduate or beyond. Race/ethnicity was categorized as: non-Latino White, Latino Spanish (completed survey in Spanish), Latino English (responded in English), non-Latino Black, and non-Latino Asian. We consider Latinos who responded in Spanish to be less-acculturated in relation to those who responded in English [21].

Analysis

To account for the complex survey design of HINTS, a weighted analysis using STATA 10, SVY module was used to calculate accurate population parameter estimates and confidence intervals for the US adult population. Multivariable logistic regression analysis was used to examine current knowledge about four cancer preventive behaviors and risk factors. Each outcome was regressed on race/ethnicity and sociodemographic covariates. To examine the third research question, another set of models that included interaction terms to test for

moderation was included. Interaction terms were computed by multiplying the race/ethnicity variable with beliefs about cancer causes.

Results

Sample Characteristics and Univariate Distributions

About three quarters of the raw (unweighted) sample (78.3 %) were White, non-Hispanic and 9.5 % were Black, non-Hispanic (Table 1). Nearly 10 % were Latino, which was split by language of interview—6.7 % of the raw sample consisted of Latinos who responded in English, while just over 2 % responded in Spanish.

Knowledge of cancer prevention behaviors and risk factors varied by racial/ethnic and language group.

Differences in Knowledge and Beliefs by Race and Ethnicity (RQs 1 and 2)

Race/ethnicity was a strong independent predictor of knowledge of some cancer risk factors. In population-weighted analyses, after adjusting for demographics, Spanish-speaking Latinos had more than three times the odds (OR=3.38 [95 % CI, 1.81, 6.32]) of knowing that exercise decreases cancer risk compared with non-Hispanic Whites (Table 2). Moreover, Spanish-speaking Latinos had lower odds to know this compared with all other race/ethnic groups, including English-speaking Latinos. Spanish-speaking Latinos had somewhat higher odds of knowing weekly exercise recommendations compared with non-Hispanic Whites (OR= 1.66 [95 % CI, 0.91, 3.04]). However, Spanish-speaking Latinos were least likely of any group to articulate the daily fruit and vegetable intake guidelines: They had 75 % lower odds (OR=0.24 [95 % CI, 0.13, 0.46]) of indicating individuals should have five or more servings of fruits and vegetables each day compared with non-Hispanic Whites.

English-speaking Latinos had lower odds of knowing that exercise decreases cancer risk (OR=0.74 [95 % CI, 0.53, 1.04]) and being familiar with fruit and vegetable guidelines (OR=0.71 [95 % CI, 0.51, 0.97]). African-Americans and Asian-Americans have lower odds of having knowledge of cancer risk factors, after adjusting for age, sex, and education (Table 2).

There are differences by race/ethnicity on odds of holding fatalistic beliefs about cancer controllability. Non-Hispanic Whites have greater odds of believing that “everything causes cancer” compared with all other ethnic groups. Although all Latinos had lower odds than non-Hispanic Whites of holding this belief, Spanish-speaking Latinos had half the odds (OR=0.38 [95%CI, 0.22, 0.68]) of English-speaking Latinos (OR=0.67 [95%CI, 0.49, 0.91]).

All racial/ethnic minority groups had greater odds than did non-Hispanic Whites of believing that “cancer is not preventable.” All racial/ethnic groups are equally likely to believe there are “too many recommendations about how to prevent cancer.” Spanish-speaking Latinos had four times the odds of non-Hispanic Whites of believing that “cancer is not preventable” (OR=4.04 [95%CI, 2.59, 6.32]).

Differences in Knowledge and Beliefs by Race and Ethnicity (RQ 3)

Finally, we considered the joint effects of race/ethnicity and fatalistic beliefs on cancer prevention knowledge, controlling for sex, age, and education. Table 3 includes the results from a series of logistic regression models: Each of five knowledge outcomes was regressed on four separate beliefs, race/ethnicity, the interaction of those, and demographic controls. The odds ratios for the main effects and interaction terms of the variables of interest are presented in each row of Table 3.

African-Americans, English-speaking Latinos, and Asians were consistently less likely to have cancer risk knowledge compared with non-Hispanic whites and also compared with Spanish-speaking Latinos (Table 3, main effects). Spanish-speaking Latinos had higher odds of knowing most cancer risk factors (except fruit and vegetable recommendations), compared with non-Hispanic Whites. There was no overall significant pattern of interaction effects (Table 3, interaction effects).

Discussion

Our study used a nationally representative dataset to examine whether fatalistic beliefs and cancer prevention knowledge systematically varied by race/ethnicity/acculturation and considered whether race/ethnicity/acculturation and fatalistic beliefs jointly affected cancer prevention knowledge. Consistent with previous studies, we found that racial/ethnic minorities were less likely to know about cancer risk factors and that those who held two fatalistic beliefs also were less likely to have this knowledge. However, when we considered the interaction of race/ethnicity and fatalism, the negative effects on knowledge appeared to be somewhat neutralized. That is, minorities who held specific fatalistic beliefs did not have different odds than their non-Hispanic White counterparts, and in some cases, had greater odds, of knowing cancer risk factors. Additionally, we found that non-Hispanic Whites had greater odds of believing that “everything causes cancer,” compared with all other race/ethnic groups.

Implications for Cancer Education

Characterizing populations who lack knowledge about cancer risk factors and recommendations for prevention can inform health education efforts and promote greater efficiency in targeting educational and behavioral interventions to specific populations, as well as provide insights into the success of education efforts. Results from our study suggest that continued education is needed for all racial/ethnic groups about cancer causes, prevention behaviors, and risk factors. Knowledge levels were low for all groups, even after adjusting for other demographic variables (data not shown). This is a generally hopeful finding that while there remains a substantial proportion of the population who are unaware of cancer prevention knowledge, there is at least no race-based disparity in knowledge. However, our findings point to a subtler disparity: Cancer risk information may be particularly failing to reach English-speaking Latinos; this group was less likely to have knowledge compared with both non-Hispanic Whites and to Spanish-speaking Latinos. This finding is especially troublesome because there is some evidence that this population (i.e., more-acculturated Latinos) has higher behavioral risk factors than other populations [1].

Together, these findings suggest that cancer risk education should prioritize targeted cancer risk communications for English-speaking Latinos.

This study also demonstrated a high prevalence of fatalistic beliefs about cancer causes and controllability across all racial/ethnic groups, although some beliefs were more likely to be held by specific racial/ethnic groups. For example, non-Hispanic Whites had greater odds than all other racial/ethnic groups of believing that "everything causes cancer," and lower odds than all other racial/ethnic groups of believing that "cancer is not preventable." This combination of beliefs seems counterintuitive but could be explained by considering communication inequalities in the context of a complex information environment. That is, access to information about cancer causes and controllability is patterned by race, ethnicity, language, and social class: Non-Hispanic Whites, for example, are more likely than racial/ethnic minorities to have access to the Internet and to obtain health information from multiple sources [26]. At the same time, the cancer information environment continues to expand, offering a bewildering array of information, some of it contradictory [17]. Previous studies have found that exposure to contradictory health information produces confusion and fatalism [9; 16]. Observed results from this study may be a function of this dynamic: Because racial/ethnic minorities are exposed to less health information, they may be exposed to less conflicting health information, and this reduced exposure may prove somewhat protective against information overload (e.g., the belief that "everything causes cancer") and cancer fatalism (e.g., "cancer is not preventable"). Future research may test this hypothesis, perhaps by combining HINTS data with a national dataset capturing information exposure [14].

Limitations

There are several limitations of this study. First, the HINTS 2008 is cross-sectional, which limits the ability to make claims about the causal order of observed associations. For example, it is possible that a lack of knowledge about cancer risk factors contributes to fatalistic beliefs about cancer controllability, rather than the other way around. Additionally, observational studies are usually underpowered to detect interaction effects [15]. A failure to detect interaction effects, however, does not mean they do not exist. In fact, our data showed a pattern of results that was not statistically significant but which pointed to the moderating effects of race/ethnicity/acculturation on fatalistic beliefs about cancer causes in ways that suggest differential effects of information exposure. Another potential methodological limitation is that the measures of knowledge ask about awareness of recommendations for good health, but not cancer, specifically. Since physical activity and eating fruits and vegetables are associated with multiple healthy outcomes, knowledge or lack of knowledge about these cancer risk factors may in fact be due to desires to prevent cardiovascular disease or diabetes or something else. This limitation is not likely to have influenced the results reported herein, but it is worth noting that motivations to engage in lifestyle-related cancer prevention behaviors may not have to do with cancer.

We acknowledge that knowledge and beliefs are not behaviors, and as such, this study makes no claims about racial/ethnic differences in cancer prevention behaviors. Knowledge and beliefs are described as antecedents to behavior in several health behavior theories [2,8],

and for this reason, they are often important factors considered in cancer education efforts. Moreover, awareness of cancer risk factors has been positively associated with behaviors like adherence to prevention recommendations [10]. However, these studies have examined mostly mainstream U.S. Anglo culture, and the relationship between beliefs and/or knowledge of "facts" and rational behavior change may not necessarily hold in other cultures. On a related note, the study questions ask somewhat simple questions about complex ideas within a framework that deliberately isolates the construct of cancer fatalism from a multi-faceted, dynamic system of cultural beliefs. This is an unavoidable methodological limitation in survey research, but nonetheless merits consideration. In fact, it is not clear that holding the belief that cancer is not preventable necessarily entails that individuals will not follow healthy behavior recommendations, for example, as we noted above, individuals may choose to engage in healthy behaviors for motivations other than cancer prevention.

Conclusion

Our study expands current understanding of how fatalistic beliefs held by racial/ethnic minorities affect knowledge about cancer risk factors and knowledge of recommendations for cancer prevention.

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Table 1

Sample characteristics by race/ethnicity and interview language, unweighted

Total sample (*N*=6,956)									
	White, non-Latino		**Latino, English**		**Latino, Spanish**		**Black, non-Hispanic**		**Asian, non-Hispanic**	
	***n*=5,445**		***n*=466**		***n*=156**		***n*=687**		***n*=202**	
	%	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***
Female	60.6	3300	61.4	286	57.1	89	68.4	470	56.7	114
Age, years										
18–34	11.9	647	28.6	133	35.1	54	18.0	122	21.0	42
35–49	22.7	1231	31.2	145	27.3	42	25.9	175	38.5	77
50–64	33.2	1799	25.2	117	23.4	36	36.8	249	29.0	58
65+	32.1	1739	15.1	70	14.3	22	19.6	131	11.5	23
Education										
Less than high school	6.2	338	17.7	82	58.3	91	15.6	107	7.5	15
High school diploma or GED	24.5	1332	28.5	132	23.1	36	26.7	183	11.9	24
Some college or technical school	29.9	1626	31.5	146	10.9	17	32.9	226	20.4	41
College degree	39.4	2142	22.3	103	7.7	12	24.8	170	60.2	121
Knowledge (correct/incorrect)										
Exercise decreases risk of cancer	64.7	3367	55.6	243	73.5	97	51.4	328	65.9	124
Weekly exercise recommendations	42.3	1897	34.7	134	49.3	66	34.2	187	34.1	60
Daily fruit and vegetable guidelines	41.1	2201	25.6	117	12.8	20	24.1	161	24.8	49
HPV as a cause of cervical cancer	75.4	2764	81.2	203	72.4	55	71.7	274	72.8	67
Beliefs about cancer controllability (% agree/strongly agree)										
Cancer is mostly caused by behavior	47.6	2563	46.4	214	74.8	113	43.3	292	64.5	129
Everything causes cancer	51.7	2771	52.8	242	42.9	64	49.6	334	44.0	88
Cancer is not preventable	22.4	1205	39.9	170	61.8	94	28.9	195	33.0	66
Too many recommendations about how to prevent cancer	73.9	3979	73.5	336	78.2	118	72.5	488	78.4	156

Table 2

Odds of holding fatalistic beliefs and having cancer prevention knowledge by race/ethnicity/acculturation, weighted and adjusted for age, sex, and education

	White, non-Hispanic	Latino English	Latino Spanish	Black, non-Hispanic	Asian, non-Hispanic
Odds ratio (95 % confidence interval)					
Knowledge (correct=1; incorrect=0)					
Exercise decreases risk of cancer	1.00	0.74* (0.53, 1.04)	3.38**** (1.81, 6.32)	0.62**** (0.49, 0.79)	0.75 (0.49, 1.16)
Weekly exercise recommendations (≥30 min/day/≥5 days)	1.00	0.79 (0.59, 1.07)	1.66* (0.91, 3.04)	0.93 (0.67, 1.28)	0.83 (0.47, 1.48)
Daily fruit and vegetable guidelines (≥5/day)	1.00	0.71** (0.51, 0.97)	0.24**** (0.13, 0.46)	0.49**** (0.36, 0.65)	0.48** (0.25, 0.92)
HPV causes cervical cancer	1.00	1.12 (0.59, 2.12)	1.17 (0.44, 3.10)	0.59*** (0.40, 0.87)	0.39** (0.18, 0.86)
Beliefs about cancer causes (agree/strongly agree=1; disagree/strongly disagree/don't know=0)					
Cancer is mostly caused by behavior	1.00	1.04 (0.82, 1.32)	4.04**** (2.59, 6.32)	0.86 (0.66, 1.39)	1.58 (0.87, 2.87)
Everything causes cancer	1.00	0.67*** (0.49, 0.91)	0.38**** (0.22, 0.68)	0.64*** (0.47, 0.87)	0.48*** (0.28, 0.80)
Cancer is not preventable	1.00	1.71**** (1.25, 2.34)	3.53**** (2.02, 6.17)	1.11 (0.88, 1.39)	2.01*** (1.19, 3.39)
Too many recommendations about how to prevent cancer	1.00	0.77 (0.54, 1.10)	1.21 (0.67, 2.19)	0.81 (0.60, 1.09)	1.08 (0.57, 2.01)

Multivariable logistic regression models are adjusted for sex, age, and education and use post-stratification weights to account for sampling design and adjust to the U.S. population

* $p<0.10$,

** $p<0.05$,

*** $p<0.01$,

**** $p<0.001$

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Table 3

Summary of joint effects of fatalistic beliefs and race/ethnicity/acculturation, weighted and adjusted for sex, age, and education, on four dichotomous knowledge outcomes (separate models per belief, per outcome)

	Belief	NHW	Latino English	Latino Spanish	Black	Asian	NHW	Latino English	Latino Spanish	Black	Asian
	Odds ratio	Odds ratio for race/ethnic group (main effect in the interaction model)					Odds ratio for the interaction of the belief (row) with race/ethnicity (column)				
Exercise decreases cancer risk											
Behavior causes	2.02*	1.00	0.85	1.77	0.59****	0.65	1.00	0.74	1.79	1.11	1.19
Not preventable	0.34*	1.00	0.79	2.94**	0.58*	0.65	1.00	1.12	2.37	1.31	2.02
Too many recommendations	0.68*	1.00	0.75	3.37**	0.42****	0.39***	1.00	0.95	0.99	1.65	2.19
Everything causes	0.91	1.00	0.99	3.29****	0.51*	0.76	1.00	0.57***	1.00	1.51	0.89
Exercise recommendations (≥30 min/≥5 days/wk)											
Behavior causes	1.06	1.00	0.94	2.36	0.96	0.92	1.00	0.70	0.60	0.94	0.86
Not preventable	0.95	1.00	0.79	1.31	0.99	0.87	1.00	1.03	1.65	0.74	0.79
Too many recommendations	0.82**	1.00	0.81	1.87	0.98	0.55	1.00	0.97	0.86	0.94	1.61
Everything causes	0.56***	1.00	1.09	1.57	0.98	0.93	1.00	0.56***	1.22	0.97	0.73
Fruit and vegetable recommendations (≥5/day)											
Behavior causes	1.15	1.00	0.54****	0.22	0.39*	0.86	1.00	1.71	1.12	1.59**	0.34
Not preventable	0.60*	1.00	0.73	0.31**	0.42*	0.49***	1.00	1.05	0.88	1.83	1.20
Too many recommendations	0.59*	1.00	0.54***	0.38	0.42**	0.92	1.00	1.43	0.54	1.17	0.39
Everything causes	0.78****	1.00	0.41****	0.19*	0.37*	0.41***	1.00	2.56**	1.72	1.69***	1.37
HPV causes cervical cancer											
Behavior causes	1.11	1.00	1.42	0.40	0.53**	0.54	1.00	0.62	4.93***	1.34	0.55
Not preventable	0.79	1.00	0.97	1.56	0.58**	0.39***	1.00	1.53	0.89	1.14	1.05
Too many recommendations	0.72****	1.00	0.78	2.25	0.74	0.29	1.00	1.61	0.47	0.73	1.48
Everything causes	1.17	1.00	1.07	1.74	0.87	0.40***	1.00	1.09	0.34	0.49	1.02

* $p<0.10$,

** $p<.05$,

*** $p<0.01$,

****$p<0.001$

Multivariable logistic regression models are adjusted for sex, age, and education and use post-stratification weights to account for sampling design and adjust to the U.S. population