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Predictors of Emergency Preparedness among Older Adults in the United States

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Abstract

Introduction—Emergency preparedness becomes more important with increased age, as older adults are at heightened risk for harm from disasters. In this study, predictors of preparedness actions and confidence in preparedness among older adults in the US were assessed.

Methods—This nationally representative survey polled community-dwelling older adults ages 50–80 (n=2,256) about emergency preparedness and confidence in addressing different types of emergencies. Logistic regression was used to identify predictors of reported emergency preparedness actions and confidence in addressing emergencies.

Results—Participants' mean age was 62.4(SD=8); 52% were female and 71% were non-Hispanic white. Living alone was associated with lower odds of having a seven day supply of food and water (aOR=0.74, 95% CI 0.56, 0.96), a stocked emergency kit (aOR=0.64, 95% CI 0.47, 0.86) and having had conversations with family or friends about evacuation plans (aOR=0.59, 95% CI% 0.44, 0.78). Use of equipment requiring electricity was associated with less confidence in addressing a power outage lasting more than 24 hours (aOR=0.66, 95% CI 0.47, 0.94), as was use of mobility aids (OR=0.65, 95% CI 0.45, 0.93).

Conclusions—These results point to the need for tailored interventions to support emergency preparedness for older adults, particularly among those who live alone and use medical equipment requiring electricity.

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Keywords

Older Adults; Emergency Preparedness; Disaster Planning; Social Isolation; Empowerment of Older Persons

Introduction

Thousands of older adults across the United States (U.S.) have suffered severe effects from recent disasters such as Hurricanes Maria, Harvey, and Irma in 2017, and the 2018 California wildfires. In addition to billions of dollars in property damages, these events caused substantial morbidity and mortality among older Americans.[1–4] Disasters are expected to increase in frequency, severity, and cost as effects from climate change increase,[1] while at the same time the population of older adults worldwide is projected to expand. [5]

Applying principles of emergency preparedness, which have the goal of mitigating the potential effects of a disaster, can help support older adults to maintain health and function in the event of a disaster. However, despite the emphasis placed on preparedness across multiple organizations and media campaigns, challenges with communication and low prioritization of disaster planning have been identified as issues for older adults.[6] At the same time, the potential negative effects of disasters on older adults are more severe in terms of health and long-term recovery.[7,8] Older adults are at heightened risk for harm from disasters as they may have added vulnerabilities such as impaired mobility, cognitive deficits, chronic diseases, social isolation, and limited financial resources.[9]

This study sought to understand how levels of emergency preparedness—both in terms of actual preparedness actions and confidence in feeling prepared to address disaster situations—are affected by challenges common with aging. The broader goal was to identify populations that may benefit from targeted interventions to support emergency preparedness. Therefore, the purpose of this study was to examine predictors of emergency preparedness and confidence in ability to address emergency situations among a nationally representative sample of older U.S. adults.

Methods

Sample

The National Poll on Healthy Aging (NPHA) is a recurring household survey of U.S. older adults aged 50–80 years conducted with the goal of informing older people, health care professionals, and policy makers on a variety of important health issues that affect older adults and their families.[10] The NPHA emergency preparedness survey was fielded in May 2019 by the University of Michigan Institute for Healthcare Policy and Innovation. The NPHA uses the Ipsos KnowledgePanel (Ipsos Group Public Affairs LLC), a probability-based internet survey panel designed to be representative of the United States population, where the sample is generated using address-based sampling. Demographic information is collected from panel members, which is then used to generate and adjust design weights in order to ensure respondent characteristics reflect U.S. Census population estimates. Previous

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NPHA surveys using KnowledgePanel have included topics such as sleep,[11] loneliness, dental care, health care overuse[12] and brain health.[13] The survey was administered online to a randomly selected, stratified sample of 2,256 individuals in May 2019, where the overall response rate was 76%. The University of Michigan Institutional Review Board reviewed this study and deemed it exempt from human subjects review because it was a study of deidentified respondents.

Assessment of Emergency Preparedness Questions

In the survey, respondents were asked about the following domains: 1) experiences with past emergency situations, 2) use of community alert warning systems, 3) communication about preparedness with family or friends, 4) use of essential medical equipment that requires electricity, 5) emergency preparedness supplies, 6) confidence about preparedness, 7) information sources in the event of a disaster, 8) opinions on likelihood of experiencing a disaster, and 9) perceived challenges associated with evacuation (see appendix for full survey questions). Preparedness questions were created based on key recommendations from leading disaster response sources including the American Red Cross,[14] the Federal Emergency Management Agency[15] and the Centers for Disease Control and Prevention.[16]

Demographics

Basic demographic information was self-reported by respondents. Demographic variables included age, sex, race/ethnicity (White, non-Hispanic; Black, non-Hispanic; Hispanic; Other/multiple), education level, and total household income. Respondents also answered questions on their use of mobility aids (defined as use of a cane, walker, wheelchair, electric scooter or other), physical health status (excellent, very good, good, fair, poor), and the number of people living in their household. In addition, respondents were asked if they had experienced an emergency situation in the past year.

Data Analysis

Basic descriptive statistics were first calculated. Associations between preparedness and confidence were examined using chi-square with 95% confidence intervals. Logistic regression was then used to predict outcomes of interest. The first category of outcomes was emergency preparedness actions, defined as 1) having a seven day supply of food and water, 2) having a seven day supply of essential medications and equipment, 3) having a stocked emergency kit that meets recommended guidelines, and 4) having had conversations about evacuation plans with family and friends. A second category of outcomes was confidence in ability to address one of three emergency situations: 1) power outage lasting more than 24 hours, 2) severe weather and 3) evacuation from home. The main predictors of interest for each category of outcomes were 1) living alone, 2) physical health status, 3) use of mobility aids and 4) use of essential medical equipment requiring electricity because individuals in these categories may be at greater risk for harm from disasters. Models were adjusted for age, sex, race/ethnicity, income, and education. Odds ratios were calculated, and a two-tailed $p<.05$ was considered statistically significant. Data analysis was completed using Stata version 15.1 (StataCorp LP, College Station, TX). All analyses used survey weights to generate nationally-representative estimates.

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Results

Among the 2,256 respondents, the mean age was 62.4 ± 8.0 years and 52% were female. Of the four categories of race and ethnicity, 71% were non-Hispanic White, 11% were Black, 11% were Hispanic, and almost 7% reported as being of other or multiple races. 32% held a bachelor's degree or higher. More than half (56.7%) reported a household income of more than $60,000 per year, while 20% had a household income less than $30,000. 73% had experienced an emergency situation in their lifetime, while 22% had experienced an emergency situation in the past year. Among all respondents, 16% lived alone, 9% used medical equipment that requires electricity and 9% used mobility aids. (Table 1).

Living alone was associated with a decrease in preparedness for certain actions, including lower odds of having a seven day supply of food and water (aOR=0.74, 95%CI 0.57, 0.96), having a stocked emergency kit (aOR=0.64, 95%CI 0.47, 0.86) and having had conversations with family or friends about evacuation plans (aOR=0.59, 95%CI 0.45, 0.78). (Table 2)

Use of essential medical equipment requiring electricity was associated with higher odds of having a seven day supply of food and water (aOR =1.49, 95% CI 1.05, 2.11) but not with having a seven day supply of essential medications and equipment, having a stocked emergency kit, or having had conversations about evacuation with family or friends. Associations between physical health status and use of mobility aids were not observed with any of these four predictors of emergency preparedness.

Earning an income of less than $30,000 was associated with lower odds of having a seven day supply of food and water (OR=0.69 95% CI 0.51, 0.93) compared to those with an income of $30,000 to $60,000 per year. Having a high school education or less was associated with lower odds of having a stocked emergency kit (OR=0.68 95% CI 0.53, 0.87) and having had conversations about evacuation plans with family/friends (OR=0.69 95% CI 0.55, 0.87) when compared to those with a high school degree. Higher odds of having a seven day supply of food and water (OR=1.32 95% CI 1.10, 1.58) and a seven day supply of essential medications and equipment (OR=2.06 95% CI 1.55, 2.75) were seen with age of 65–80 years compared with age of 50–64 years.

Self-reported excellent or very good health was associated with higher odds of confidence in ability to address each of the three emergency situations, including power outage (aOR=1.88, 95% CI 1.49, 2.38), severe weather (aOR=1.83, 95% CI 1.49, 2.25) and evacuation from home (aOR=1.66, 95% CI 1.34, 2.05), while poor health did not differ from the reference group of self-reported good health. Use of essential medical equipment requiring electricity was associated with less confidence in ability to address a power outage (aOR=0.66, 95% CI 0.47, 0.94). Less confidence was seen in the group using mobility aids in both confidence to address power outages (aOR=0.65, 95% CI 0.45, 0.93) and severe weather (aOR=0.63, 95% CI 0.44, 0.91). Living alone was not significantly different than the reference group in terms of confidence in addressing emergency situations.

Hispanic ethnicity was associated with lower odds of confidence in power outages lasting more than 24 hours (OR=0.53, 95% CI 0.39, 0.73), severe weather (OR=0.43, 95% CI 0.31,

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0.61) and evacuation from home (OR=0.70, 95% CI 0.50, 0.97). Black race was associated with lower odds of confidence in ability to address severe weather (OR=0.66, 95% CI 0.48, 0.92) and power outages lasting more than 24 hours (OR=0.63 95% CI 0.45, 0.88). Female sex was associated with lower odds of confidence in evacuation from home (aOR=0.66, 95% CI 0.55, 0.80). (Table 3).

The association between preparedness actions and levels of confidence in addressing emergency situations was also examined. Respondents who reported taking preparedness actions had higher levels of confidence than those not taking preparedness actions. (Table 4).

Discussion

This nationally representative survey of older adults aged 50 to 80 examined emergency preparedness actions and confidence in ability to address disaster situations. Following the Sendai Framework for Disaster Risk Reduction, this study was conducted from the standpoint that older adults are the key stakeholders in preparedness and should be the central focus of conversations about preparedness and aging.[17] This study looked specifically at emergency preparedness among older adults who may be at greater risk for harm from disasters, including those living alone, those with poor physical health, those using mobility aids, and those using electrically-dependent essential health equipment (such as oxygen concentrators or home dialysis machines, among others). This study found that individuals with these challenges were less likely to have taken preparedness steps, and in some cases were less likely to feel confident in their ability to address common emergency situations.

In this study, older adults who live alone were less likely to be prepared for emergency situations. When compared to older adults who did not live alone, those living alone were less likely to have a seven day supply of food and water, a stocked emergency kit, or to have had conversations with family or friends about their plans in the event of a need to evacuate. Individuals who use essential medical equipment requiring electricity were more likely to have a seven day supply of food and water, but they did not differ significantly in other preparedness actions, including having a stocked emergency kit or having discussed evacuation plans with family and friends. Other factors, such as income and social relationships, likely influence this as well. It is encouraging that older adults aged 65 to 80 had higher odds of having a seven day supply of food, water essential medications, and equipment than the reference group of ages 50 to 64. Individuals reporting a bachelors degree or higher had were less likely to have a 7-days supply of food and water, and less confidence about the need to evacuate from home than the reference group, respectively. This may be related having more education and therefore, more income. Individuals with lower income and less education were less likely to have taken the other preparedness actions, like having a stocked emergency kit or talking to family about evacuation plans. Addressing this disparity is an important consideration for emergency preparedness planners. It is also important to learn how these groups are situated in their communities in order to determine how community-level factors contribute to emergency planning.

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Identifying those older adults less confident in their ability to address emergency situations is an important consideration in emergency planning. In this study, individuals who use mobility aids were less likely to feel confident in their ability to address a power outage when compared to those not using mobility aids. Individuals who use medical devices requiring electricity had similar results. However, both of these groups did not differ from those who do not use these devices in terms of confidence in ability to address severe weather or the need to evacuate from their homes. Making space for older adults to be empowered about taking steps to be prepared, in keeping with the Sendai Framework's[17] focus on older adults as stakeholders, is an important consideration. Disparities also exist by race and ethnicity in terms of confidence to address emergency situations, where Black, Hispanic and other racial/ethnic groups reported less confidence in their abilities to address emergency situations than the reference group of White race. Women were also less likely than men to be very confident in addressing the need to evacuate from home. Additional efforts to improve confidence in addressing emergency situations should be directed at these specific groups of older adults. Conversely, older adults who reported being in "excellent" health had high levels of confidence in their ability to address various emergency situations, while those with "poor" physical health were not different than the reference group of those with "good" health. Finally, the finding that even individuals who have taken steps to be prepared may not have high levels of confidence in certain emergency situations (such as evacuating from home) indicates that a better understanding of what contributes to this lack of confidence is needed. At the same time, there is value in understanding why individuals who have not taken preparedness actions feel confident in their ability to address certain emergencies, such as extended power outages. Exploring the individual reasons for confidence, or lack thereof, is an important consideration for future research.

Given that close to 85% of older Americans are living with one or more chronic diseases,[18] which often require access to medications and other treatments, specific diets, and reliable transportation to health appointments, a greater focus on supporting vulnerable older adults to reach optimal levels of emergency preparedness is necessary. This population could receive additional preparedness information and support from trusted sources, including local aging organizations such as Area Agencies on Aging or faith-based organizations. An additional consideration would be to encourage clinicians to discuss preparedness actions for those with chronic medical conditions during routine patient visits.

Public health officials have long struggled with how to help people of all ages prepare for disasters and emergencies. Guidance specific to older adults to adequately prepare for these disruptions exists across multiple entities including through AARP, Federal Emergency Management Agency and the American Red Cross. Surveys of the general population of the U.S., however, have indicated that despite the many resources available to aid in planning, many of the populations surveyed are underprepared for emergencies.[19,20] The current study echoes these findings in terms of preparedness actions, calling attention to the need for preparedness messaging and communication interventions that achieve adequate uptake among the most vulnerable populations.[21] Emergency preparedness messages generally focus on telling people how to prepare, but it is important to ensure they are delivered in a way that encourages behavior change, i.e. actually taking actions to prepare.[22] While many organizations have developed emergency preparedness communication geared towards

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older adults, measuring the effectiveness of these interventions is critical. Social cohesion, or how connected groups are within and to a community, has been shown to be a strong factor in disaster recovery.[23,24] Applying these principles to preparedness by engaging older adults in preparedness activities within the wider community can facilitate not just personal preparedness, but may also encourage families, friends and community members to follow their example to become more prepared.[25]

Limitations

The NPHA panel does not include adults over 80 years of age, thereby excluding the oldest Americans. There are many other factors that may affect preparedness (such as examining wider groups of race and ethnicity, or including mental health) that were not included in the larger study design but that may contribute to a greater knowledge base about aging and preparedness. Overall, this paper examines older adults within the context of their own homes; alone or with their loved ones and does not address the community-level factors that contribute to preparedness. There is also the risk of bias in this study. Recall bias is a potential concern, as is response bias common in surveys relying on self-reported measures.[26] The potential for non-response bias, common to survey research, also exists. The use of survey weights helps account for this limitation. Finally, there is the risk of multiple comparison problems from applying more than one statistical test on the same set of observations.

Conclusion

The current results support the identification of at-risk groups who may benefit from tailored interventions to support preparedness, specifically those living alone and those who are using mobility aids or medical devices requiring electricity. Focusing preparedness efforts on the unique needs of specific groups of older adults and on empowering older adults may help limit adverse health effects related to disasters.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Characteristics of US adults (50–80 years)

	n	Mean or Percent	(95% CI)
Total			
Age, years	2,256	62.4 (mean)	(62.0, 62.7)
Sex			
Female	1,192	52.5%	(50%, 54%)
Male	1,064	47.5%	(45%, 50%)
Race and Ethnicity			
White, non-Hispanic	1,687	71.4%	(69%, 73%)
Black, non-Hispanic	217	10.7%	(9%, 12%)
Hispanic	212	11.3%	(10%, 13%)
Other/multiple	140	6.6%	(5%, 8%)
Education			
High school or less	810	41.2%	(39%, 43%)
Some college	700	26.6%	(25%, 28%)
Bachelors degree or higher	746	32.2%	(30%, 34%)
Marital Status			
Married or partnered	1,566	67.1%	(65%, 69%)
Not married or partnered	690	32.9%	(31%, 35%)
Employment status			
Employed	1,108	52.9%	(51%, 55%)
Retired	945	35.7%	(34%, 38%)
Not working at this time	203	11.4%	(10%, 13%)
Health status			
Excellent to very good	974	41.8%	(40%, 44%)
Good	886	39.2%	(37%, 41%)
Fair to poor	389	19.0%	(17%, 21%)
Total household income			
Less than $30,000	345	20.6%	(19%, 23%)
$30,000 to $59,999	502	22.7%	(21%, 25%)
$60,000 or more	1,409	56.7%	(54%, 59%)
Use of mobility aids	208	9.5%	(8%, 11%)
Use of electrically dependent medical equipment	198	8.6%	(90%, 92%)
Live alone	342	15.7%	(14%, 17%)
Experienced an emergency situation in the past year	493	21.9%	(20%, 24%)

Abbreviations: CI, Confidence Interval

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Table 2.

Predictors of emergency preparedness actions among U.S. adults aged 50–80 years

	Has 7 day supply of food and water		Has 7 day supply of essential medications and equipment		Has stocked emergency kit		Has had conversation about evacuation plans with family/friends	
	aOR[a]	95% CI	aOR[a]	95% CI	aOR[a]	95% CI	aOR[a]	95% CI
Lives alone	0.74[b]	(0.56, 0.96)	0.79	(0.54, 1.16)	0.64[b]	(0.47, 0.86)	0.59[d]	(0.44, 0.78)
Physical health status								
Excellent to very good	1.08	(0.88, 1.32)	1.14	(0.84, 1.54)	1.25	(1.00, 1.56)	1.06	(0.86, 1.30)
Good	reference							
Fair to poor	0.84	(0.63, 1.11)	0.97	(0.65, 1.44)	0.83	(0.61, 1.13)	0.96	(0.72, 1.27)
Uses essential medical equipment requiring electricity	1.49[b]	(1.05, 2.11)	1.58	(0.94, 2.67)	1.40	(0.99, 1.99)	1.22	(0.87, 1.70)
Use of mobility aids	0.92	(0.65, 1.31)	1.16	(0.70, 1.93)	1.39	(0.97, 1.99)	1.40	(0.99, 1.98)
Sex								
Female	0.99	(0.82, 1.19)	0.97	(0.74, 1.28)	1.15	(0.94, 1.41)	1.16	(0.96, 1.40)
Male	reference							
Race								
Black, Non-Hispanic	1.32	(0.95, 1.82)	0.70	(0.45, 1.08)	1.08	(0.77, 1.51)	1.10	(0.80, 1.50)
White	reference							
Hispanic	0.89	(0.65, 1.22)	0.49[d]	(0.33, 0.72)	0.94	(0.67, 1.32)	1.25	(0.92, 1.71)
Other, Non-Hispanic	1.01	(0.66, 1.54)	0.69	(0.39, 1.25)	0.85	(0.55, 1.33)	0.88	(0.57, 1.34)
Age								
50 to 64 years	reference							
65 to 80 years	1.32[b]	(1.10, 1.58)	2.06[d]	(1.54, 2.75)	0.91	(0.74, 1.10)	0.86	(0.71, 1.03)
Total household income								
Less than $30,000	0.69[c]	(0.51, 0.93)	0.86	(0.56, 1.31)	0.86	(0.61,1.20)	0.92	(0.67, 1.25)
$30,000 to $59,999	reference							
$60,000 or more	0.84	(0.66, 1.08)	0.98	(0.69, 1.38)	0.89	(0.69, 1.16)	0.97	(0.76, 1.24)
Education								
High school or less	0.85	(0.68, 1.07)	0.76	(0.55, 1.04)	0.68[b]	(0.53, 0.87)	0.69[c]	(0.55, 0.87)
Some college	reference							
Bachelor's degree or higher	0.77[b]	(0.60, 0.97)	1.10	(0.77, 1.56)	0.91	(0.71, 1.16)	1.11	(0.88, 1.41)
higher								

Abbreviations: aOR, adjusted odds ratio; CI, Confidence Interval

a: Odds ratios are adjusted for all other characteristics in the table

b: $p<.05$

c: p<.01

d: p<.001

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Table 3.

Predictors of confidence in addressing emergency situations among U.S. adults aged 50–80 years.

	Very confident in ability to address[a]					
	Power outage		Severe weather		Evacuation from home	
	aOR[b]	95% CI	aOR[b]	95% CI	aOR[b]	95% CI
Lives Alone	1.01	(0.75, 1.36)	1.06	(0.81, 1.28)	0.93	(0.71, 1.22)
Physical Health Status						
Excellent to very good	1.88[e]	(1.49, 2.38)	1.83[e]	(1.49, 2.25)	1.66[e]	(1.34, 2.05)
Good	reference					
Fair to poor	0.90	(0.68, 1.21)	1.08	(0.81, 1.44)	0.97	(0.73, 1.30)
Uses essential medical equipment requiring electricity	0.66[c]	(0.47, 0.93)	0.83	(0.58, 1.19)	0.96	(0.68, 1.36)
Use of mobility aids	0.65[c]	(0.45, 0.93)	0.63[d]	(0.44, 0.91)	0.70	(0.48, 1.01)
Sex						
Female	0.86	(0.71, 1.06)	0.84	(0.70, 1.01)	0.66[e]	(0.55, 0.80)
Male	reference					
Race/ethnicity						
Black, Non-Hispanic	0.63[d]	(0.45, 0.88)	0.66[c]	(0.48, 0.92)	1.02	(0.73, 1.41)
White	reference					
Hispanic	0.53[e]	(0.39, 0.73)	0.43[e]	(0.31, 0.61)	0.70[c]	(0.50, 0.97)
Other, Non-Hispanic	0.54[d]	(0.35, 0.85)	0.50[d]	(0.33, 0.77)	0.68	(0.43, 1.02)
Age						
50 to 64 years	reference					
65 to 80 years	1.00	(0.81, 1.22)	0.72[d]	(0.59, 0.86)	0.90	(0.75, 1.08)
Total household income						
Less than $30,000	1.00	(0.73, 1.38)	0.90	(0.66, 1.22)	0.86	(0.63, 1.18)
$30,000 to $59,999	reference					
$60,000 or more	1.16	(0.89, 1.50)	1.00	(0.78, 1.27)	1.08	(0.84, 1.38)
Education						
High school or less	0.99	(0.78, 1.26)	0.87	(0.69, 1.09)	0.82	(0.65, 1.02)
Some college	reference					
Bachelors degree or higher	1.05	0.81, 1.36)	0.84	(0.66, 1.07)	0.68[d]	(0.54, 0.87)

Abbreviations: aOR. Adjusted odds ratio; CI, Confidence Interval

a: Response options included ‘very confident,’ ‘somewhat confident,’ and ‘not confident.’ ‘Very confident’ tested as outcome. See full survey instrument in Appendix.

b: Odds ratios are adjusted for all other characterstics in the table

c: p</−.05

d: p<.01

e: p<.001

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Table 4.

Association between preparedness actions and confidence in addressing emergency situations among U.S. adults aged 50–80 years.

Preparedness actions		Very confident[a] in ability to address		
		Power outage	Severe weather	Evacuation from home
7-day supply of food and water	Yes	75%	54%	45%
	No	62%	39%	32%
7-day supply of essential medications/health supplies	Yes	74%	52%	43%
	No	47%	28%	21%
Stocked emergency kit	Yes	79%	62%	52%
	No	65%	41%	33%
Had conversations about evacuation from home	Yes	75%	54%	49%
	No	65%	43%	32%

Note: Unadjusted association tested using chi-squared analysis; p-value <0.001 for all analyses

a: Response options included ‘very confident,’ ‘somewhat confident,’ and ‘not confident.’ ‘Very confident’ tested as outcome. See full survey instrument in Appendix.