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Peace, Love, and Conspiracy Theories: How Experiences and Worldviews Shape Age Cohorts' Views of Science

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Whether the safety of vaccines, climate change, or COVID-19, the origins of science skepticism appear the same: When misinformation prevails and individual liberties appear threatened, people will resist. Who are today's science skeptics and what motivates their beliefs? I argue that older populations are the most likely age cohort to oppose mainstream scientific consensus, based upon their collective memories of mid-century scientific events and latent changes to US public school science curricula. Evidence also suggests a relationship between motivated cognition and conspiracist thinking linked to older age groups' worldviews and preferred social media platforms. To test hypotheses, regression models analyzed data from an existing survey in which participants (N = 2,002) were asked a series of questions on scientific topics. Results suggest a relationship between age and certain views of science, particularly among oldest and youngest age cohorts. Views are also relative to experiences and perceptions developed during age cohorts' formative years. Religion, partisanship, and education level also matter for select scientific topics and findings indicate the interplay of factors responsible for certain age cohorts' views of science.

Introduction

In early 2020, COVID-19 struck the world. Although most people accepted data and guidelines produced by scientific experts and leaders, others opposed preventative measures (Czeisler et al., 2020). Conversely, when select public officials deflected expert recommendations, some citizens self-imposed safety measures beyond government mandates (Badr et al., 2020). Although COVID-19 provided grounds for distrust in institutions and for conspiracist thinking, opposition to science is not isolated to global pandemics. While healthy skepticism of science serves to advance fields of study and public understanding, overt denialism is counterproductive (Lipsitch, 2020). Moreover, decisions of those who oppose science disproportionately affect others and policy denial adopted by institutions is dangerous (Lewandowsky & Oberauer, 2016). As a result, when the world's most powerful country holds the world's highest

COVID-19 mortality rate, it raises the questions — Who are today's science skeptics and what motivates their beliefs?

Evidence suggests that compared to younger individuals, older populations are more likely to oppose modern scientific consensus. Individuals aged 65 and older, for example, are the age group most likely to favor building the Keystone Pipeline, favor increased production of fossil fuels, and to assert that government funding of basic science programs is not worth the investment (Pew, 2013; Pew, 2015a). In addition, although this age group is the population most vulnerable to COVID-19, their compliance with wearing masks is lower than would be expected (Daoust, 2020). They are also less racially diverse, less likely to have a college degree, more religious, and more politically conservative compared to younger populations (Maniam & Smith, 2017; Pew, 2018; US Census, 2015). Evidence on older populations' collective memories, education, and worldviews may help to explain why.

Note, I do not discount the negative implications or discriminatory concerns associated with ageism. While assigning collective beliefs to an age group may appear problematic, prior literature suggested that researchers should look to defined age cohorts to better understand views and behavior (Erll, 2008; Mannheim, 1952; Reulecke, 2008). Like this paper, others have identified collective views by connecting them to key moments in history (Campbell et al., 1960; Ghitza et al., 2019; Piller, 1991; Schuman & Rodgers, 2004; Sturken, 1997).

I first apply theories surrounding the formation of views to events of older populations' chronology. Since generations are social constructs, I do not attempt to define what constitutes a population as "older"; however, based upon prior literature and age groups categorized in existing data, my hypotheses surround individuals aged 65 and older. In addition, as the motives behind science skepticism vary, I utilize a multi-dimensional definition: Opposition, also referred to herein as denial or skepticism, refers to those who disbelieve, distrust, or disagree with modern scientific consensus. Next, quantitative analysis illustrates differences among demographic groups regarding opposition to mainstream scientific consensus. Finally, I conclude with a discussion of the findings and recommend areas in which further research is needed.

The formation and perpetuation of views

To discern why individuals and groups adopt certain views, researchers have long looked to the origins of behavior. Although behaviorists argue whether perceptions are formed rationally or irrationally, authors agree that views are the result of individualistic variables rooted deeply in personal experience. While some literature in this paper dates back almost a century, their conclusions remain relevant and are further strengthened when applied to current, and increasingly political, events.

Theories of guided democracy assert that individuals are completely disconnected from the world and are thus unable to understand it. Self-

centered individuals and self-contained communities, formed by isolated views or herd mentality, perpetuate misinformation. Once disconnectedness reaches a level at which individuals can no longer recall why they hold certain views, they will still argue them to be true (Bernays, 1923; Lippman, 1922). Identity is also an amalgamation of personal environment and experiences. While it is possible for views to shift, they are unlikely to do so unless influenced by more impactful experiences and/or changes to social milieu (Campbell et al., 1960; Schuman & Rodgers, 2004).

Motivated cognition, i.e., the desire to reach conclusions which align with existing views, influences how individuals process new information (Nisbet et al., 2015). Worldviews based on the Bible predict views of certain scientific matters (e.g., evolution and abortion) and affiliation with evangelical sects predicts negative views of science in general (Jelen & Lockett, 2014). Older populations are overwhelmingly religious and significantly evangelical: Approximately 70% of individuals 65 and older, as well those aged 50 to 64, are certain God exists. Comparatively, 62% of 30 to 49-year-olds and 51% of 18 to 29-year-olds believe the same. In addition, 49% of evangelicals are 50 and older, compared to 33% who are between the ages of 30 to 49 and 17% who are between the ages of 18 to 29 (Pew, 2014). While not all religious individuals oppose science, how individuals interpret and accept information suggests that older populations may find it challenging to accept scientific information. Moreover, when worldviews represent religious identity, difficulty reconciling religious beliefs with conflicting scientific information is likely twofold.

Other behaviorists insist that identity is a rational and retrospective process (Fiorina 1981; Key 1966). Pope Francis (2020), for example, published a statement imploring Catholics to fully divest from fossil fuel affiliations and adopt green energy practices to combat climate change. In contrast, many evangelical and non-profit right-wing think tanks have significant ties to industries who promote science skepticism (Oreskes and Conway, 2010). While people may be rational, or at least have the ability to be, these arguments do not discount the core postulations of irrational behavior theories so deeply rooted in personal perceptions: An individual's identity and views are byproducts of the environment in which they are familiar and the experiences they recall. Similarly, whether an individual accepts science is largely contingent upon their exposure to, attitude towards, education in, and overall understanding of scientific information.

Individuals with, or who are surrounded by, negative views of science are less likely to choose a scientific education or career (McPhetres & Zuckerman, 2018). Lack of scientific literacy decreases the understanding of jargon, which perpetuates negative attitudes and disbelief in scientific information (Shulman et al., 2020). Specific to older age cohorts, a systematic study of science in US public schools did not exist prior to the

World War II technology boom of the 1930s (Miller, 1983). Despite such efforts to promote nationwide scientific literacy, US schools had no lawful restrictions on evolutionary science curricula until the 1980s (*Edwards v. Aguillard*, 1987). Although the Court's decision provided a giant step forward for US education and the advancement of science, its implementation had no direct effect on older populations who aged out of the education system years before the ruling took effect.

Other identifiers may also help to explain distrust in science or the desire for scientific advancements to not affect their own lives. While the term "not in my backyard" (NIMBY) groups is a modern colloquialism, collective opposition to science occurred as early as the seventeenth century (Piller, 1991). Proponents of science skepticism also include individuals with vested interests, those with ties to conservative think tanks, and advocates of free market economies; Republicans have shown decreased trust in science since 1974 (Gauchat, 2012; Jacques et al. 2008; Oreskes & Conway, 2010). While these attitudes may reflect personal interests, ideology, and influence from counter-movements, behavioral research suggests that such an identifiable shift signifies a marked change in collective perceptions. Interestingly, older age cohorts came of age during a time of prominent and problematic cultural events of the twentieth century — many of which culminated in 1974.

Collective memories of mid-century political mayhem

As mentioned, collective memories provide the lens in which cohorts remember their past. Moreover, experiences during individuals' late teens and early twenties are the most memorable (Mannheim [1927] 1952; Schuman et al., 1998; Schuman & Rodger, 2004; Schuman & Scott, 1989). As a result, experiences and knowledge obtained during age cohorts' formative years are the most influential on later behavior (Campbell et al., 1960; Ghitza, 2019; Gongaware, 2011; Middleton and Brown, 2008). In other words, we can expect views of older age cohorts to reflect collective memories of their youth; specifically, those memories which intertwine the exciting rise of mid-century scientific and technological developments with the subsequent decline of trust in science and institutions.

For those who remember it best, the atomic age encompassed the end of World War II and a new realm of nuclear science development. While the United States positioned itself as a global superpower, its government was at an impasse. Impending threats necessitated modern defense technology but maintaining international control of nuclear power presented a critical challenge. Tensions also remained high during Soviet nuclear development and the Cold War, providing only a brief cessation of conflict. As a result, civilians and experts alike struggled to reconcile perceptions of national security with personal fears (Fehner & Gosling, 2012; OSU, n.d.).

At the same time, Americans grappled with diminished trust towards institutions. In the late 1940s, in response to perceived Communist threats, the Central Intelligence Agency conducted a series of scientific experiments and projects related to drug and torture-induced mind control. The last of these projects, MK-Ultra, employed physicians and researchers from over 200 universities and medical facilities. Although some experts claim they were unaware of their affiliation with the project, others intentionally worked in secrecy to avoid controversy (Bejesky, 2012). Meanwhile, and unbeknownst to the American public, the US maintained significant political involvement in Vietnam following World War II and throughout the 1960s. Excerpts of documents (i.e., the Pentagon Papers) were published on the front page of *The New York Times* in 1971. Aside from confirming many Americans' speculations, the reports revealed institutional misconduct back to the Truman administration (Ellsberg, 2003).

Revelations of institutional deceit did not stop there. In 1972, Nixon's concerns with reelection prompted the Watergate scandal (Ellsberg, 2003). Upon threats of declassification, MK-Ultra ceased operation in 1973 and all internal documents were destroyed. Nevertheless, researchers pieced together files related to other secret projects and from court documents related to the death of Frank Olson (Bejesky, 2012). Soon after, and mere months after Nixon's resignation, *The New York Times* released a front page exposé which alleged "The Central Intelligence Agency, directly violating its charter, conducted a massive, illegal domestic intelligence operation during the Nixon Administration against the antiwar movement and other dissident groups in the United States" (Hersh, 1974, par. 1). The article, which ultimately prompted investigation into MK-Ultra and other secret government projects, was published on December 22, 1974.

Conspiracy thinkers and counter-movements

Although formative years impact views and behavior, memories are subjective. As a result, memories are often molded to fit modern narratives (Erll, 2008; Harris, 2006). Just as motivated cognition affects scientific literacy, it also opens the door to conspiracist thinking (Nisbet et al., 2015). Like religion, conspiracist thinking provides reasoning and group identity to those who seek to establish solutions to dissonant information. As a result, conspiracist thinking may transfers to other views, whether the topics are related or not (Lewandowsky et al., 2013). While coping mechanisms related to collective memories are not unexpected as a response to trauma, the ways in which older individuals self-perpetuate fears and misinformation is astounding.

While science fiction is conventionally ahistorical, the desire for personal expression during the atomic age resulted in science fiction films and other media which intertwined fictional elements with non-fictional threats (Hendershot, 1999). As a result, entertainment provided a tangible existence in which trauma could be understood, shared, and collectively

remembered. In the 1954 horror film *Them!*, for example, ants mutated into giant man-eating monsters after nuclear bomb tests in New Mexico. In *Dr. Strangelove or: How I Learned to Stop Worrying and Love the Bomb* (1964), the Cold War conflict between the Soviet Union and the United States took a comedic turn. Although threats depicted in *Them!* and *Dr. Strangelove* are of the distant past, similarly themed entertainment remains a part of contemporary pop culture: *Watchmen* (1986) depicted Dr. Manhattan as a nuclear physicist and superhero amidst President Nixon's fifth term and ongoing tensions with the Soviet Union. *Stranger Things* (2016) and *Chernobyl* (2019) also demonstrate the public's ongoing fascination with, and inadvertent osmosis of, the history and fantasy surrounding nuclear fallout, mind control, and institutional deceit.

Social media platforms also furnish conspiracist thinkers and counter-movements with shared aggregates of science skepticism. YouTube and Facebook are the social media platforms most used by baby boomers (currently aged 57 to 75), with 70% and 68% of this cohort using the platforms, respectively (Statista, 2019). YouTube announced plans in 2019 to reduce the spread of misinformation, however a recent longitudinal study found "a clear positive correlation between the conspiracy likelihood of the source video and the conspiracy likelihood of the recommended video," (Faddoul et al., 2020). Faddoul et al. also noted that while YouTube does not reveal how their algorithms work, the company admitted openly that keeping users engaged is a critical component of maintaining ad revenue, and that users prefer to see content that agrees with existing views. An earlier study also found that for posts related to misinformation and conspiracy theories, the majority of likes and comments were from users who regularly interacted with conspiracy content (Bessi et al., 2015).

Facebook also faces increased scrutiny for perpetuating such misinformation. While the company established a team of third-party experts to evaluate non-factual content, opinion and satire pieces were exempt from fact-checking. As a result, these posts circumvented expert analysis and allowed misinformation to prevail (Horwitz, 2019). Not surprisingly, counter-movement organizations closely affiliated with the fossil fuel industry celebrated Facebook's decision and stated plans to use the policy to their advantage (Waldman, 2020). By labeling content as opinion, as the loophole allows them to do, counter-movement organizations can continue to aggressively push climate science misinformation. Considering older populations' prevalent use of Facebook and YouTube, it is evident how false information and negative attitudes are magnified.

Collectively, evidence suggests older populations' views to be reflective of the knowledge and experiences obtained during their formative years. For those who developed early distrust in science, perceptions have fostered disinterest and disconnectedness to evolving scientific information. Vested interests, conspiracist thinking, and NIMBY

behavior —influenced by agendas of anti-science and counter-movement organizations — reinforce existing opinions and worldviews. Self-contained communities decrease scientific literacy and increase disconnectedness, while social media preferences promulgate discord amongst those with oppositional views. As a result, I hypothesize that older populations are more likely than younger aged cohorts to oppose modern scientific consensus. I also expect to find that lesser education, religious affiliation, and Republicanism increase opposition towards science, based upon older populations' worldviews. In addition, if cohorts' views differ among scientific topics, opposition should be relative to memories from their formative years.

Dependent variables

To test hypotheses surrounding opposition to science, I examine data from the 2014 Pew Research Center General Public Science Survey.[1] I included questions which also indicated religious affiliation as well as corresponding scientists' views. Questions were formulated to ask respondents 1) which statements came closest to their view, 2) whether items or topics were generally safe or unsafe, and 3) whether they favored or opposed certain items or topics.[2] Items and topics included:

- Evolution
- Climate change
- Vaccines
- Population growth
- Astronauts in space
- Use of animals in scientific research
- Building more nuclear power plants for electricity
- Increased use of fracking
- Increased use of biofuel
- Increased offshore oil and gas drilling
- Pesticide safety
- Genetically modified food safety

To ascertain mainstream scientific consensus for each topic, data is compared to results from a corresponding survey in which scientists of the American Association for the Advancement of Science (AAAS) were asked questions regarding the same scientific topics (Pew, 2015b). As a result, scientific consensus is defined as responses given by AAAS scientists which received the greatest number of results.

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[1] Pew Research Center bears no responsibility for the analyses or interpretations of the data presented here. The opinions expressed herein, including any implications for policy, are those of the author and not of Pew Research Center.

[2] See Pew Research Center's 2014 General Public Science Survey for information on how original data was collected.

Independent variables

Age

Since age largely influences subjective knowledge, age is indicative of views of science. Sociologist Karl Mannheim ([1927] 1952) suggested that while the categorization of generations was undoubtedly a social construct, the broad grouping of individuals served as a critical starting point for understanding views and identity. Furthermore, while Mannheim's descriptions of generations remained ambiguous, his work emphasized the influence that age has on individual and collective views. "Life begins-round about the age of 17," he wrote. "Sometimes a little earlier and sometimes a little later," (Mannheim, 1952, p. 300). In later research based upon Mannheim's theory, quantitative analysis found that influential memories "refer back disproportionately to a time when the respondents were in their teens or early 20s" (Schuman & Scott, 1989, p. 377). Age was categorized based upon original survey data and is included as: 18 to 29, 30 to 49, 50 to 64, and 65+.

Education

While the focus of this study relates to science skepticism, science opposition is a political issue. As such, modern analysis of *The American Voter* (1960) supports arguments regarding the impact of education.

Burden (2009) presented multiple hypotheses concerning the effect that a college education has on voting behavior; three are of relevance to this paper and its inclusion of education as a pertinent variable. First, political participation is reflective of the type of person who attends college, rather than attendance itself. College attendees tend to come from families who are more knowledgeable and politically involved, and who are typically of higher socioeconomic status. Next, as politics become harder to understand having a college degree provides the advantage of knowledge and skills required to digest political information. Finally, an evolving educational curriculum may explain political behavior. Sometime over the last fifty years, Burden suggested, a high school education either became less mobilizing or college education became more mobilizing. Including education is, therefore, an important addition to the data set. Education is categorized as:

- HS or less: Individuals whose highest level of education is high school or less.
- Net college: Average of individuals who have completed undergraduate or postgraduate degrees.

Partisan identity

Others suggest that politicians are to blame for decreased trust in science. Republicans' failure of moderate policy efforts in the 1990s and

subsequent efforts to regain power led to an extreme shift in ring-wing ideology (Smith, 2010). Opposition to science may also be the result of a culture war. Issues like climate change, health care, and abortion are not viewed with the same lens as other scientific evidence and are conversely aligned with liberal ideology. As a result, oppositional views are immediately challenged due to perceptions of the party — and not the purpose (Hoffman, 2012). Although partisanship alone does not predict views of science, opposition to science may circumstantially reflect Republicans more than Democrats due to the nature of current events (Lewandowsky & Oberauer, 2016). As a result, partisan identity is included and categorized as follows:

- Republican: Individuals who identify as Republican or leaning Republican.
- Democrat: Individuals who identify as Democrat or leaning Democrat.

Religion

As mentioned, religion serves as a significant predictor of science skepticism (Jelen & Lockett, 2014). While negative attitudes towards science are consistent among religious Americans, attitudes elsewhere vary (McPhetres et al., 2020). Nevertheless, a recent study of COVID-19 deaths in England and Wales showed that the lowest rate of death was among those who identified as non-religious (White & Gaughan, 2020). While researchers recognized that further study is needed, results imply that certain religious sects are at a higher risk of death than others. As a result, findings suggest that religious affiliation not only predicts attitudes towards science, but also determines how anti-science behaviors affect certain populations. Religion's synonymity with older populations' worldviews warrants its inclusion in the dataset and is categorized as follows:

- Religious: Average of individuals who identify as religious.
- Unaffiliated: Individuals who identify as unaffiliated with any religion.

Results

Multiple models test the impact of age, education, religion, and partisanship on oppositional views of science. I include fixed effects for sex/gender (male; female as reference) and race/ethnicity (white, black, and Hispanic; other as reference). All variables were scaled to a 0 to 1 range; categories corresponding to "Don't know/Refused" were excluded. Binary logistic regressions were conducted for each distinct question to determine which groups, if any, were more likely to predict opposition to scientific consensus. Table 1 contains descriptive statistics for included variables.

Table 1

Descriptive statistics

	Min.	Mean	Std. Dev.	Max	Number of obs.
18 to 29	0	.1753	.38034	1	2002
30 to 49	0	.2572	.43722	1	2002
50 to 64	0	.3047	.46039	1	2002
65+	0	.2478	.43182	1	2002
Religious	0	.7732	.41885	1	2002
Republican	0	.2268	.41885	1	2002
HS or Less	0	.3487	.47666	1	2002
Male	0	.5030	.50012	1	2002
White	0	.6059	.48878	1	2002
Black	0	.1289	.33514	1	2002
Hispanic	0	.1798	.38413	1	2002

Model 1 tests individual variables only, omitting any impact of variable interactions to establish a base for observation. Table 2 presents a sample of regression results; results were consistent across samples. *Religious, Republican,* and *HS or Less* were significant, but dependent on scientific topic. With exception to *18 to 29* regarding offshore drilling, age was non-significant.

Table 2

US adults' views of science

	Offshore Drilling			*Climate Change*		
	B	SE	OR	B	SE	OR
Constant	-0.776	0.466	0.460	-0.952	0.797	0.386
18 to 29	-0.957***	0.459	0.384	-1.028	0.799	0.358
30 to 49	-0.558	0.452	0.217	-1.004	0.784	0.491
50 to 64	-0.306	0.451	0.497	-0.711	0.780	0.362
65+	-0.154	0.454	0.735	-0.373	0.786	0.689
Religious	-0.783***	0.125	2.187	0.294	0.239	1.342
Unaffiliated						
Republican	1.577***	0.143	4.840	2.187***	0.226	8.905
Democrat						
HS or less	-0.101	0.109	0.351	0.487*	0.209	1.627
Net college						
Male	0.762***	0.104	2.143	0.102	0.190	1.107

Female						
White	0.235	0.185	0.204	0.076	0.370	1.078
Black	0.202	0.219	0.358	-0.059	0.434	0.943
Hispanic	-0.161	0.212	0.448	-1.190**	0.457	0.304
Other						
N	1922			736		
-2LL	2298			719		
	$x^2 = 353$, $df = 11$, $p < 0.001$			$x^2 = 172$, $df = 11$, $p < 0.001$		
Nagelgerke R^2	23%			30%		
Hosmer & Lemeshow	$p = 0.666$			$p = 0.093$		
Classification accuracy	69%			79%		

* = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

Model 2 accounts for the inclusion of interaction effects. Table 3 presents a sample of regression results; results were consistent across samples. *Religious*, *Republican*, *65+* by *Republican,* and *HS or Less* by *Republican* were significant. In other words, individuals who are religious, Republican, Republican aged 65 and older, as well as Republican without a college education, are more likely than other groups to oppose scientific consensus.

Table 3

US adults' views of science with interaction variables

	Fracking: Model 1			*Fracking: Model 2*		
	B	SE	OR	B	SE	OR
Constant	-1.292	0.474	0.006	-1.343	0.483	0.261
18 to 29	-0.144	0.465	0.866	-0.197	0.463	0.821
30 to 49	-0.078	0.459	0.925	-0.101	0.455	0.904
50 to 64	-0.091	0.457	0.913	-0.087	0.519	0.916
65+	0.129	0.460	1.138	0.581	0.547	1.787
Religious	0.568***	0.128	1.764	0.642***	0.198	1.901
Unaffiliated						
Republican	1.425***	0.130	4.156	1.084**	0.390	2.957
Democrat						
HS or less	-0.004	0.110	0.996	0.271	0.250	1.311
Net college						
Male	0.643***	0.103	1.902	0.637	0.104	1.311
Female						
White	0.059	0.187	1.061	0.056	0.188	1.058
Black	0.362	0.222	1.436	0.354	0.223	1.424
Hispanic	-0.282	0.216	0.754	-0.327	0.218	0.721

Other				
65+ * HS		-0.508	0.276	0.602
50 to 64 * HS		-0.229	0.297	0.795
65+ * Religion		-0.538	0.355	0.584
50 to 64 * Religion		-0.102	0.297	0.903
65+ * Republican		0.735*	0.323	2.085
50 to 64 * Republican		0.572	0.302	1.773
HS * Religion		0.053	0.268	1.054
HS * Republican		-0.578*	0.271	0.561
Religion * Republican		0.169	0.381	1.184
N	1820	1820		
-2LL	2263	2245		
	$x^2 = 16, df = 11, p < 0.001$	$x^2 = 259, df = 20, p < 0.001$		
Nagelgerke R^2	17%	5%		
Hosmer & Lemeshow	$p = 0.044$	$p = 0.922$		
Classification accuracy	65%	18%		

* = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

Although age groups were non-significant for most scientific topics, coefficients and odds ratios for specific topics may signal age-related trends. On the topic of fracking, for example, *65+* was non-significant; however, its positive coefficient, odds ratio above 1, and significance when combined with *Republican* may hint at a positive-dose effect between age and views. Results were similar for *18 to 29* and *30 to 49* on the topic of vaccines. As a result, Model 3 utilizes Bayes factors to further test the relationship between age and views of science. All analyses were conducted using the Bayesian Pearson Correlation test in SPSS; default parameters were used. Table 4 presents the results. Results favored a relationship between age and views in most samples, specifically among *18 to 29, 50 to 64*, and *65+*.

Table 4

Bayes factors for US adults' views of science

	BF		*BF*
Evolution		Offshore Drilling	
18 to 29	5.7*	18 to 29	0.000**
30 to 49	22.603*	30 to 49	6.608*
50 to 64	24.355*	50 to 64	0.764**
65+	10.208*	65+	0.000**
Climate Change		Vaccines	
18 to 29	1.043*	18 to 29	0.009**
30 to 49	1.721*	30 to 49	0.091**

50 to 64	19.300*	50 to 64	3.159*
65+	0.039**	65+	0.000**
Animals in Research		Population Growth	
18 to 29	0.301**	18 to 29	45.672*
30 to 49	54.943*	30 to 49	33.548*
50 to 64	55.128*	50 to 64	55.481*
65+	1.456*	65+	50.460*
Nuclear Power Plants		Astronauts	
18 to 29	1.491*	18 to 29	53.409*
30 to 49	7.778*	30 to 49	20.470*
50 to 64	41.307*	50 to 64	4.833*
65+	0.000**	65+	36.010*
Fracking		Pesticides	
18 to 29	0.331**	18 to 29	22.849*
30 to 49	29.974*	30 to 49	55.256*
50 to 64	51.075*	50 to 64	54.522*
65+	0.079**	65+	24.387*
Biofuels		GMO Foods	
18 to 29	0.148**	18 to 29	35.338*
30 to 49	30.970*	30 to 49	33.559*
50 to 64	21.441*	50 to 64	51.925*
65+	4.228*	65+	2.781*

*Evidence of null hypothesis; **Evidence of alternative hypothesis (see: Lee & Wagenmakers, 2013; Jeffreys, 1961).

Discussion

Multiple factors impact cohorts' views of science. Though it is not possible to account for all factors which contribute to views and behavior, evidence indicates views relative to age cohorts' collective memory. Younger individuals' opposition to offshore drilling and fracking, as well as their favor of increased use of biofuels, are likely related to memories of extreme weather events, the rise in climate change awareness, and subsequent media attention and sustainability efforts during the 2000s to present (Otsuka, 2019). Views on the safety of pesticides, GMO foods, and vaccines indicate similar influence, as concern over these topics has grown during their formative years (Burki, 2020; Rangel, 2015). Conversely, perceptions of individuals who are older, more politically and/or religiously conservative, and less educated would have been defined prior to these periods and views may also reflect other worldviews, i.e., personal ideologies and the desire for a free market economy (Jacques et al. 2008). Not surprisingly, topics which show older cohorts' agreement with scientific consensus (i.e., mandatory vaccines and increased use of nuclear power plants) may reflect memories and knowledge from large-scale vaccine use from the 1940s forward and the atomic age, as discussed (OSU, n.d.; CHOP, 2019). As also mentioned,

views of topics like climate change may reflect a lack of scientific literacy and/or the circumstantial, and thus partisan-oriented, nature of current events (Lewandowsky & Oberauer, 2016; Shulman et al., 2020). Views among the 50 to 64 group likely indicate the arbitrary social construction of age groups, as many of the events which established collective memories during this cohort's formative years would have also been shared by individuals aged 65 and older. Finally, age was non-significant for the 30 to 49 group in all models, suggesting that other factors influence this cohort's views of science in general.

Conclusion

Memory serves as the core of identity. Since what we know is subjective, how we remember is more imperative than fact. Thus, perceptions matter. Although the impact of individual variables remains uncertain, results confirm the relationship between age, education, partisanship, and opposition to scientific consensus. As a result, these findings further support the epistemological impact that early perceptions have on long-term opinions and behavior.

Further research is needed to establish the impact that both exogenous and endogenous variables have on cohorts' opposition to science. Lack of a college degree and/or education obtained prior to the 1980s should be explored to determine how education directly correlates with opposition. Researchers should also examine whether other variants related to education predicate opposition. A closer look at academic institutions, for example, is needed to determine trends in location, curricula, instructors, and funding sources related to higher education. Vested interests of older populations, as well as trends of older age cohorts still actively engaged politically, in the workforce, and in their communities should also be analyzed. Finally, as mentioned, research should continue analysis of demographic variables and the epistemological impact of collective memories associated with different age cohorts.

In sum, age does matter. What we experience based upon our education, experiences, and worldviews are additionally contributory to forecasting perceptions. While it is impossible to fully predict human behavior, this study confirms what was evidenced in prior literature and expands the theoretical framework in which to analyze current and future generations.

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