

Opioid Epidemic News Consumption

Project: Experiments in Transmedia

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For: Patti Parson, Managing Producer
PBS NewsHour

By: Jena Barchas-Lichtenstein, John Voiklis, John Fraser, Kate Flinner, Rebecca Norlander, & Elizabeth Danter

Correspondence: Jena Barchas-Lichtenstein, jblichtenstein@newknowledge.org

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Executive Summary

In support of Transmedia research, we conducted a pre- /post-production study of early career adults' views on the opioid epidemic. Major pre-production findings were:

- We found significant differences between rural, suburban, and urban respondents across nearly all questions;
- 58% of all respondents believed they were knowledgeable about the opioid epidemic;
- The issue is relevant to a majority: 62% of respondents knew someone who had taken a non-prescribed opioid, while more than half knew someone who was or had been addicted to them; and
- The less news respondents got about the epidemic, the more likely they were to consider using medical information sources (e.g. a doctor, WebMD, the CDC) when learning about the problem – and the less likely they were to say they would go to journalistic sources.

Major findings of the post-production study were:

- Perceived relevance and science identity both have a much larger impact than story format on reactions to stories; and
- Perceived relevance has a larger impact on reactions for respondents with a low science identity.

Introduction

In October 2017, the PBS NewsHour team produced a week and a half of opioid-related content, including several online explainers, which presented the opportunity for a natural experiment for the Experiments in Transmedia project.

New Knowledge Organization Ltd. (NewKnowledge) conducted a two-wave research study to advance understanding of the youth audience's knowledge and news consumption on the topic.

The first wave of the study, conducted in September 2017, provides a baseline. The content aired in October 2017, and the second wave of the study, conducted in November 2017, asked a subset of respondents from the first wave to view some of the content to study how their knowledge changed.

This report is a revision of a report first published in November 2017.

FIRST WAVE METHODS

The baseline survey consisted of five modules.

Module 1 tested how widespread certain **myths and misconceptions** about opioids were among early career adults (ages 24-33, most not in school). The myths and misconceptions were selected from the content PBS NewsHour produced, with one positive and one negative Likert item for each.

Module 2 measured **personal connections** to the topic. A 2015 Kaiser Family Foundation survey found that more than half of Americans know someone who's taken a prescription painkiller that wasn't prescribed to them, been addicted to prescription painkillers, or died from an overdose (DiJulio, Firth, Hamel, & Brodie, 2015). The baseline survey used the same questions in order to determine if there are differences between these two groups.

Module 3 examined **news consumption**, specifically as it relates to the opioid epidemic. This module asked respondents both to reflect on the last story they consumed

on the topic, as well as their overall frequency of consuming news on this topic.

Module 4, which measured **critical health literacy**, was developed based on 4 items from the All Aspects of Health Literacy Scale or AAHLS (Chinn & McCarthy, 2013), a self-report measure designed to assess functional, communicative, and critical health literacy. The AAHLS was initially tested in a population ages 15 and older.

Module 5 tested the validity of a measure of psychographic profiles that may influence **health-related attitudes** and behavior change. These profiles, which were developed in a study of museum visitors (Fraser, 2009; Koke & Fraser, 2011), may be relevant for learning about health more generally.

The baseline survey sample was stratified to oversample rural respondents.

SECOND WAVE METHODS

Data Collection

The post survey was sent to the same panel of respondents who completed the pre-survey, with the goal of approximately 200 completed surveys. **Module 1** asked the participant to **watch a video clip or read an article** and answer a brief content question about that story to verify that they read or watched it.

Participants saw one of four stories:

- An article ($n = 50$);
- A storified Twitter chat ($n = 53$);
- A broadcast video ($n = 48$); or
- An explainer video ($n = 48$).

In this module, participants were also asked to answer qualitative questions about their response to the story.

Module 2 tested the same **myths and misconceptions** about opioids that were tested in the pre-survey. The myths and misconceptions were selected from the content PBS

NewsHour produced, with one positive and one negative Likert item for each one.

Module 3 asked the participant to identify what, if anything, they **learned** from the story.

Module 4 tested participants' reactions to the story, using instruments developed earlier for this project.

Module 5 asked participants to respond to four Likert-type statements about their news consumption habits, and then answer an open-ended question elaborating on these.

Module 6 asked participants about their science identity. Measuring science identity allowed us to consider the results alongside other audience surveys we have done with the Transmedia panel.

Data Analysis

Researchers coded responses to two of the qualitative questions in order to enable a statistical analysis. One researcher developed the categories and took the lead on coding; the second researcher spot-checked to ensure consistency.

First, we tested whether responses to the items in each survey module correlated with one another, allowing us to test each module as an aggregate. After having confirmed that aggregate testing was possible, we used Multivariate Analysis of Variance (MANOVA) to test the effects of story format, perceived story relevance, and science identity (the mean responses to the science identity module) on the responses to 3 modules: Reactions (5 items, 7-point semantic differential scale), Learning more (2 items, 5-point bipolar scale from *strongly disagree* to *strongly agree*), and Willingness to Share (3 items, 5-point bipolar scale from *strongly disagree* to *strongly agree*). We tested both the simple effects of each factor and the effect of the interaction terms for story relevance by science identity. Effects were analyzed in terms of whether factor-related differences exceeded chance (i.e., statistical significance) and the proportion of the variance in the data explained by the factor (i.e., effect size). We further inspected the univariate effects of factors on individual items in each module.

PARTICIPANTS

First Wave

Our sample for the first wave included a panel of 796 US adults between the ages of 24 and 33. Twenty-three percent lived in a rural area, 38% lived in a suburban area, and 38% lived in an urban area. Of the major racial and ethnic categories, 70% identified as White, 15% Black, 8% Hispanic, and 7% Asian. Figure 1 shows a breakdown of the most common racial categories by area. Approximately 20% of respondents are enrolled in school full-or part-time.

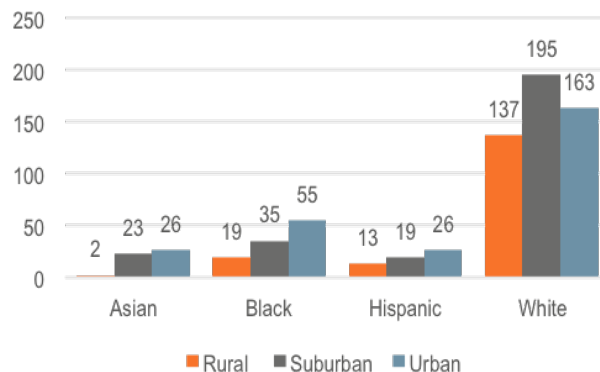


Figure 1. Respondents by region and largest racial categories.

Second Wave

The 199 respondents to the second wave were a subset of the first wave. Sixteen percent lived in a rural area, 45.2% lived in a suburban area, and 38.7% lived in an urban area. Of the major racial and ethnic categories, 71.4% identified as White, 11.1% Black, 14.6% Hispanic, and 11.6% Asian. (Participants were able to select more than one category.) Twenty-one of these respondents, or 10.6%, were enrolled in school full- or part-time.

First Wave Results

KNOWLEDGE ABOUT THE OPIOID EPIDEMIC

About a quarter of the respondents (26%) disagreed with the statement, *I am knowledgeable about the opioid epidemic* whereas more than half (58%) agreed that they were knowledgeable about the epidemic. There is a statistically significant difference in reported knowledge by area, specifically between rural and suburban areas compared to urban. Approximately 30% of those respondents in rural and suburban areas disagreed with the knowledge statement, whereas 21% of urban respondents disagreed. Two-thirds of urban respondents (66%) agreed they were knowledgeable about the opioid epidemic, compared to 54% of rural respondents and 52% of the suburban respondents.

MYTHS & MISCONCEPTIONS

We asked to rate their agreement with the following nine statements, which were based on PBS NewsHour pitches for opioid content. **An asterisk designates a false statement.**

Medical Marijuana & Opioid Use

We asked respondents to rate their agreement with two statements about the relationship between medical marijuana and opioid use:

Table 1. Responses to **In states where medical marijuana is legal, opioid use is higher than it is elsewhere.***

	Disagree	Neither	Agree
Rural	44% (82)	26% (44)	30% (57)
Suburban	35% (107)	33% (101)	32% (96)
Urban	35% (105)	20% (62)	45% (137)
Total	37% (294)	27% (211)	36% (290)

Because the statement was false, a disagree response indicates a correct answer. Rural respondents were much more likely to know this information, while urban dwellers were much more likely to answer incorrectly. Suburban respondents were much more likely neither to agree nor

disagree, which may be an acknowledgment that they don't know. These differences were statistically significant.

Table 2. Responses to **The availability of medical marijuana makes people less likely to use opioids.**

	Disagree	Neither	Agree
Rural	18% (33)	21% (39)	61% (115)
Suburban	18% (54)	30% (90)	53% (161)
Urban	16% (48)	22% (67)	62% (189)
Total	17% (135)	25% (196)	58% (465)

While this statement is in direct contradiction with the previous statement, respondents were much more likely to get it right. More than half of all respondents agreed with this statement, while less than one-fifth disagreed. Unlike the previous statement, rural and urban respondents did not show different answer patterns, and once again, suburban respondents were the most likely to answer neither. Differences between these groups of respondents were not statistically significant.

Insurance Coverage and Opioid Addiction

Responses to two statements about insurance coverage for treatment – both true and false – were fairly symmetric within the total population, suggesting that there is no strong public opinion in either direction.

Table 3. Responses to **There are almost no public treatment options for opioid addiction.**

	Disagree	Neither	Agree
Rural	44% (82)	23% (42)	33% (62)
Suburban	39% (120)	28% (84)	33% (101)
Urban	34% (104)	22% (67)	44% (133)
Total	38% (306)	24% (193)	37% (296)

Urban respondents were much more likely than rural respondents to answer this question correctly. There may be

different treatment options available in rural and urban environments, or people may have understood *public* to mean different things. However, these differences were not statistically significant.

Table 4. Responses to **Most health insurance fully covers rehab for opioid addiction.***

	Disagree	Neither	Agree
Rural	41% (76)	29% (54)	30% (57)
Suburban	41% (124)	33% (101)	26% (80)
Urban	31% (95)	27% (83)	41% (126)
Total	37% (295)	30% (238)	33% (263)

In this case, differences between regions were statistically significant. Specifically, urban dwellers were much more likely to believe – incorrectly – that most insurance fully covers treatment.

Disposal of Medication

Few people agreed with the false statement that flushing unused medication down the toilet is the best way to get rid of it, and many knew that doing so could cause it to end up in drinking water. However, there was much less agreement about government recommendations for disposal of medication.

Table 5. Responses to **Flushing unused medication down the toilet is the best way to get rid of it.***

	Disagree	Neither	Agree
Rural	50% (94)	13% (24)	37% (69)
Suburban	55% (169)	17% (51)	28% (85)
Urban	41% (125)	14% (42)	45% (137)
Total	49% (388)	15% (117)	37% (291)

Half of rural respondents, and more than half of suburban respondents, knew that flushing medication down the toilet was not the best way to dispose of it. But only two-fifths of urban dwellers answered correctly, and nearly half (45%) of them answered incorrectly, which was much more than respondents from any other region. Interestingly, very few people selected the “neither” option, which can indicate either

indifference or lack of knowledge. Differences between these three groups were statistically significant.

Table 6. Responses to **If you flush medicine down a toilet or throw it away, it can end up in drinking water.**

	Disagree	Neither	Agree
Rural	24% (45)	20% (38)	56% (104)
Suburban	19% (57)	23% (70)	58% (178)
Urban	18% (56)	20% (60)	62% (188)
Total	20% (158)	21% (168)	59% (470)

More than half of all groups knew that flushing medicine down the toilet could be environmentally hazardous. Differences between regions were not statistically significant.

Table 7. Responses to **The government recommends flushing unused medication, including opioids, down the toilet..**

	Disagree	Neither	Agree
Rural	44% (83)	23% (43)	33% (61)
Suburban	46% (139)	22% (66)	33% (100)
Urban	33% (99)	23% (70)	44% (135)
Total	40% (321)	22% (179)	37% (296)

Urban respondents were statistically significantly more likely to know that the government does recommend flushing unused medication down the toilet, even though it contradicts environmental recommendations.

Opioids & Pain

In general, respondents were aware of the complex nature of pain – yet nearly half of them believed that doctors agree that prescription painkillers are the best treatment option.

Table 8. Responses to **Pain is complex, with physical and psychological components.**

	Disagree	Neither	Agree
Rural	6% (11)	11% (20)	83% (156)
Suburban	5% (14)	15% (45)	81% (246)
Urban	4% (13)	13% (38)	83% (253)
Total	5% (38)	13% (103)	82% (655)

Respondents were overwhelmingly aware of the complex nature of pain, with more than 80% agreeing with this statement and only about 5% disagreeing. In fact, this was the statement with the highest agreement overall. Differences between regions were not statistically significant.

Table 9. Responses to **Most doctors agree that prescription painkillers are the best option for chronic pain.***

	Disagree	Neither	Agree
Rural	33% (62)	22% (41)	45% (84)
Suburban	29% (88)	29% (88)	42% (129)
Urban	23% (70)	20% (62)	57% (172)
Total	28% (220)	24% (191)	48% (385)

At the same time, responses about doctors' pain treatment recommendations were mixed, with statistically significant differences between regions. Urban respondents were the most likely to believe that doctors see painkillers as the best option, while rural respondents were the most likely to disagree with this statement.

Table 10. Mean responses to all myths and misconceptions.

	Rural	Suburban	Urban
(1) In states where medical marijuana is legal, opioid use is higher than it is elsewhere.*	4.34	4.17	3.84
(2) The availability of medical marijuana makes people less likely to use opioids.	4.91	4.74	5.00
(3) There are almost no public treatment options for opioid addiction.	3.73	3.77	4.09
(4) Most health insurance fully covers rehab for opioid addiction.*	4.21	4.21	3.89
(5) Flushing unused medication down the toilet is the best way to get rid of it.*	4.44	4.75	4.05
(6) If you flush medicine down a toilet or throw it away, it can end up in drinking water.	4.66	4.86	4.87
(7) The government recommends flushing unused medication, including opioids, down the toilet.	3.58	3.59	4.04
(8) Pain is complex, with physical and psychological components.	5.71	5.63	5.75
(9) Most doctors agree that prescription painkillers are the best option for chronic pain.*	3.79	3.88	3/31

Notes: Scale 1-7. For true statements, 1 = Strongly disagree and 7 = Strongly agree. For false statements (indicated by *), 1 = Strongly agree and 7 = Strongly disagree. The larger the number, the more respondents answered correctly.

PERSONAL CONNECTIONS

In the overall sample, 62% of respondents personally knew someone who had taken a prescription painkiller not prescribed to them. Fifty-two percent personally knew someone addicted to painkillers. Almost a quarter of respondents (23%) personally knew someone who had died from a prescription painkiller overdose. Across all questions of personal relevance, we saw significant differences between rural, urban, and suburban respondents.

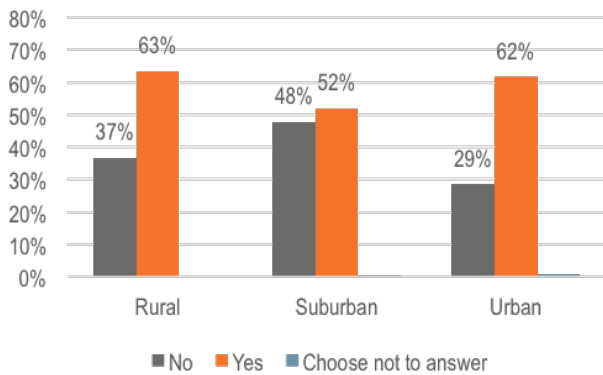


Figure 2. Responses by region to **Do you personally know anyone who has ever taken a prescription painkiller (e.g., codeine, oxycodone, etc.) that was not prescribed to them?**

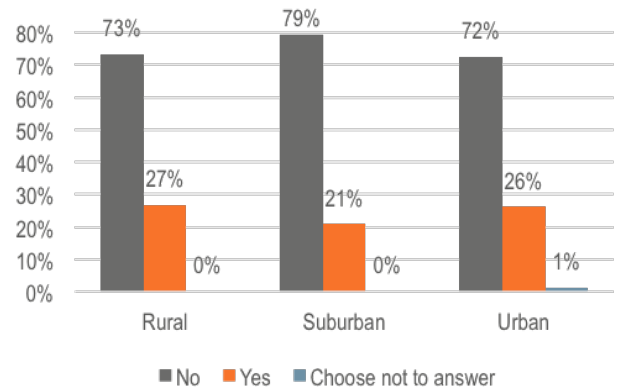


Figure 4. Responses by region to **Have you personally known anyone who died from a prescription painkiller overdose?**

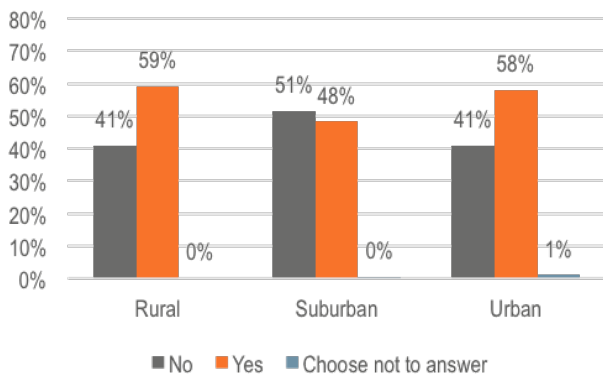


Figure 3. Responses by region to **Do you personally know anyone who has ever been addicted to prescription painkillers?**

NEWS CONSUMPTION

Respondents were asked several questions related to their consumption of news; specifically, their last exposure to opioid stories and their frequency of consumption.

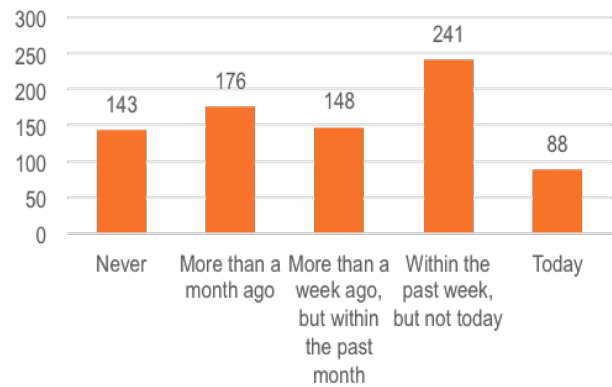


Figure 5. Responses to **When did you last get any information or news about the opioid epidemic?**

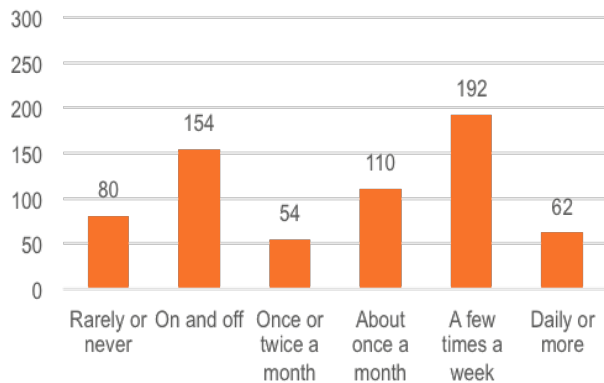


Figure 6. Responses to **How often do you get news about the opioid epidemic?**

We also asked about the pathways by which they accessed this news, as well as whether or not they sought out this news item or happened upon it. Almost half of respondents found the opioid story while getting other news. Only one in five respondents deliberately sought out a news story about the opioid epidemic.

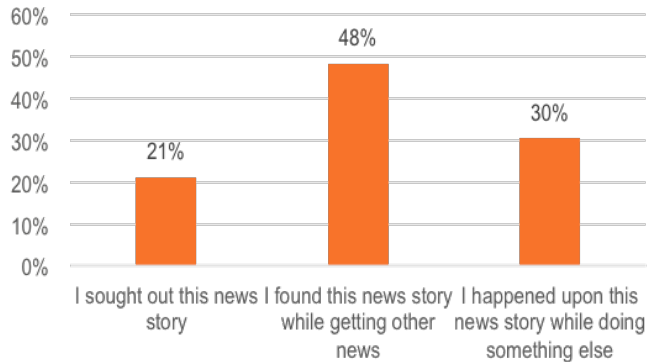


Figure 7. Responses to **Did you seek out this story, find it while getting other news, or happen upon it while doing something else?**

If you wanted more information about the opioid epidemic, where would you go first?

Responses to an open-ended question about where respondents would go for more information about the opioid epidemic were coded into four categories, based in part on the categories developed by the Media Insight Project (2015).

They divided news platforms and sources into three basic categories: *social* sources, including both social media and word of mouth; *curated* sources, including search engines, aggregators, and blogs; and *reportorial* sources, or content creators. We added a fourth category, *medical*, to reflect the large number of respondents who said they would go to their doctor; to government or non-governmental organizations like the CDC, NIH, or WHO; to medical journals or textbooks; or to sites like WebMD. However, named medical news sources that were clearly reportorial or curated were categorized as such.

We coded as many responses as possible. We were able to code many generic responses – such as *newspaper* or *news channel* or even *news* – as reportorial, while others – such as *radio*, *internet*, and *news app* – were too vague to be coded appropriately. Many people get news from a range of sources, and wrote in sources of multiple different types (e.g. *Centers for Disease Control*, *MSNBC*, *CNN* or *Google*, *Facebook*, *talk to my doctor*). Even counting the 137 respondents who did not list any news sources at all, the average respondent listed 1.3 **types** of sources.

Reportorial and curated sources were about equally popular, with 345 respondents including at least one reportorial source and 333 listing at least one curated source, with Google far and away the most common response in this category. Meanwhile, medical and social sources were much less common: only 172 respondents listed at least one social source, and 192 at least one medical source.

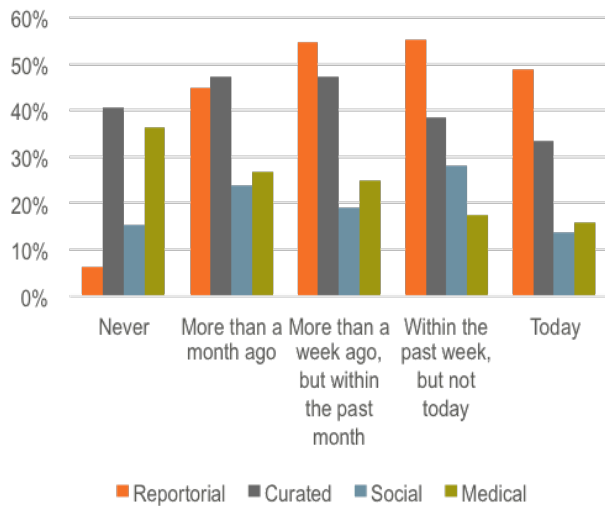


Figure 8. Types of news sources by last information received.

Types of sources were also connected clearly to most recent opioid news consumption. The less recently a person had gotten information about the epidemic, the more likely they were to list a medical source as a place they would go for information. Less than 10% of people who said they had never gotten information about the epidemic listed a reportorial source as a place they would go – but over 40% of all other respondents listed at least one such source. Meanwhile, curated and social sources did not show an obvious pattern. These data may suggest that people unfamiliar with the epidemic are most interested in basic information that remains relatively static over time – e.g. what opioids are, what the epidemic refers to – that medical sources could easily provide, while those who are following the topic may be more interested in the up-to-the-minute coverage they would receive from reportorial sources instead.

CRITICAL HEALTH LITERACY

In general, respondents answered questions about their critical health literacy positively. As Figures 9-11 show, the bulk of responses to three statements about critical health literacy were *sometimes*, *often*, or *always*.

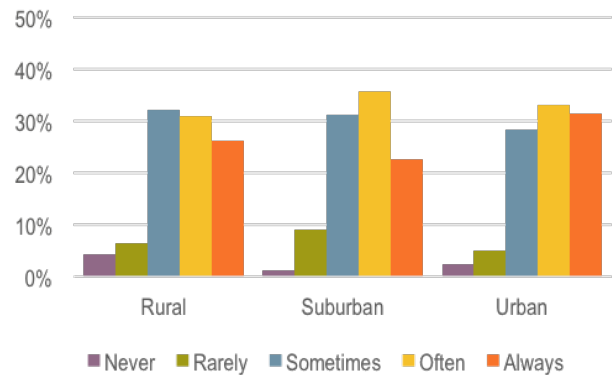


Figure 9. Responses by region to **Are you someone who likes to find out lots of different information about your health?**

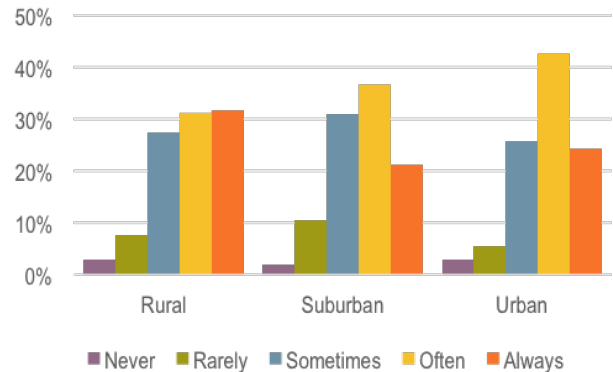


Figure 10. Responses by region to **How often do you think carefully about whether health information makes sense for you in particular?**

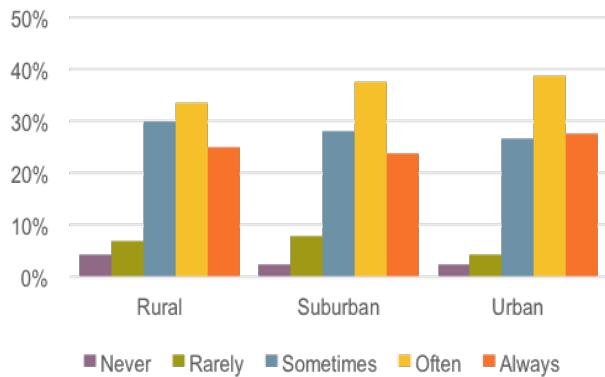


Figure 11. Responses by region to **When you get information about your health, how often do you try to determine whether it can be trusted?**

Meanwhile, a fourth question (Does it make you uncomfortable to question advice from medical professionals (e.g. your doctor or nurse)?) was worded so that *never* represents a high level of critical health literacy, whereas *always* represents a low level. Responses to this question looked quite different from responses to the first three (Figure 12), with much greater variability in responses.

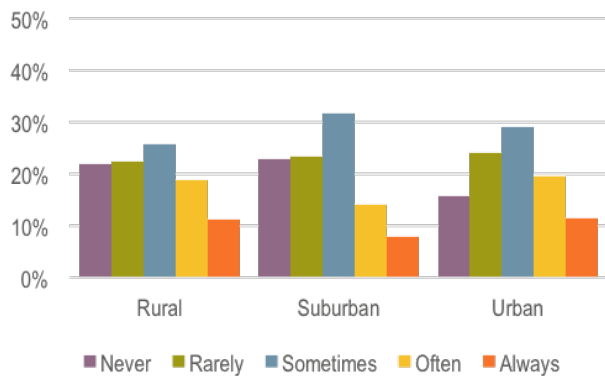


Figure 12. Responses by region to **Does it make you uncomfortable to question advice from medical professionals (e.g. your doctor or nurse)?**

Responses to all four questions are summarized in the table below.

Table 11. Mean responses to all critical health questions.

	Rural	Suburban	Urban
Are you someone who likes to find out lots of different information about your health?	3.68	3.69	3.86
How often do you think carefully about whether health information makes sense for you in particular?	3.81	3.65	3.80
When you get information about your health, how often do you try to determine whether it can be trusted?	3.68	3.73	3.85
Does it make you uncomfortable to question advice from medical professionals (e.g. your doctor or nurse)?*	2.75	2.61	2.87

Note: Scale 1-5, where 1 = Never and 5 = Always. An *Always* response represents a higher level of critical literacy, except where indicated by an asterisk*.

Second Wave Results

REACTIONS TO THE STORIES

Respondents to the post survey watched or read one of four NewsHour stories about the opioid epidemic. We asked them to provide open-ended responses to the stories, and we also employed many of the same multiple-choice instruments we used to test previous NewsHour STEM stories.

Open-Ended Responses

Before responding to the rest of the survey, we asked respondents to give us their reaction to the stories they saw. The first question was general, while the second question asked them to think specifically about the format.

- Please describe how you **feel** about the story in 1-2 sentences. What did you think about the way the topic was framed, especially compared to other stories you have seen on this topic?
- What about the format (e.g. length, details, visuals, presentation)?

Responses were positive across the board, with the words *informative* and *interesting* coming up repeatedly for all four stories. However, some comments varied heavily by the story participants saw. We consider each story in turn.

Article

Many participants mentioned the article's balance as a highlight, with one writing, *[...] this story represents many different angles of the issue, from the immediacy of the situation to considering the long-term. [...] I found it more balanced than other articles I have read on the matter.* Multiple respondents also called out the use of *the perspective of an actual person experiencing opioid addiction* as particularly effective storytelling.

A number of participants described visceral responses to the subject matter, which made them feel *sad*, *sick*, or *enraged* about addiction, particularly if the topic was personal for them.

The most common response to the question about format was that the article was on the long side. However, several participants also noted that they found the length necessary to make the point, exemplified by one who wrote, *It was a little lengthy but packed vital information for those that are seeking ways out of addiction.*

Storified Twitter Chat

Responses to the Twitter chat were more mixed than responses to the article. In addition to *interesting* and *informative*, respondents found it *timely* – but the format was divisive, and personal preference seems to play more of a role than for any other format. Many respondents liked the short question-and-answer format. However, editing the tweets in future Twitter chats and compiling or reformatting them into a transcript format might improve readability.

Ten respondents either failed to understand what they were reading, or actively disliked the format. They were frustrated by the visual effect of tweets taking up too much space, or by *too many abbreviations and partial sentences*. Two of these ten failed to realize that the tweets were, in fact, the main story. One wrote, *The Twitter feeds beneath the article took up a large amount of space*, and another said, *I disliked the mess of tweets at the bottom, they didn't seem to serve any purpose*. These responses also raise the possibility that other respondents may have read only the framing paragraphs in the beginning.

The storified Twitter was one of two formats for which respondents specifically mentioned *science*. One respondent described the Twitter chat as *Pretty scientific yet in a very readable and understandable form*. A second wrote, *It felt official, researched, and scientifically supported*. Taken together, these responses suggest that these respondents view science positively. A number of respondents also highlighted *statistics* as a strength of this piece; the researchers believe that a focus on numbers in the introduction may have contributed to readers' sense that it was *scientific*.

Broadcast Video

Many respondents appreciated the use of *real life stories*, which made it *grittier, more raw*. Many also had emotional reactions, often connected to the use of personal narratives: one participant, who found it *sad*, also noted, *this story focused more on the people versus all the policy around opioids*.

Participants liked having a video rather than just text, with a number specifying that they enjoyed the visuals, including the map and being able to put faces to the story. However, reactions to the length were variable: several participants wished it were shorter, while others wished it were longer. One person explicitly contrasted online and broadcast platforms, writing, *I'm more likely to watch something that is 5 minutes or less when online, but if I had seen it as an actual news story, I think it's the appropriate length*. If this intuition about different platforms is widespread, it pairs with early career adults' general move away from broadcast to online platforms to suggest that they are more likely to watch shorter stories.

Explainer Video

Several participants noted that having two presenters was a strength, and that switching between Nsikan, Julia, and a former user was effective. They also appreciated the *clear visuals* and *the overall production value*.

The explainer video (along with the storified Twitter) was one of the two formats in which respondents specifically mentioned *science*. All three explainer viewers who mentioned *science* saw it as a particular strength of this format:

- *I think it was more informative because of how it explained more scientific aspect of how it interacts with the brain.*
- *I felt like it was an interesting take because the more scientific details really put it in perspective.*
- *It seemed very educational and straightforward, much more about the science and not emotional.*

The words *information* and *informative* appeared particularly frequently in the comments for this format, and respondents

reacted positively to the ability to pack in so much information while still holding their interest.

Comparison

What the researchers found most surprising about these qualitative responses were the similarities across all four formats. Participants found all four *interesting, informative, and clear*, suggesting that the NewsHour style transcends story format.

These results also provide a counter-narrative to the industry-wide reluctance to consider changing formats, discussed in previous focus groups with the production team (Roberts et al., 2017). In this study, differences between the four formats seem to come down to personal preference rather than consistent contrasts that are attributable to the format itself.

Multiple-Choice Responses

We asked respondents to rate the story they read or watched along six 7-point semantic differential scales:

- Reliability (from *unreliable* to *reliable*);
- Interest (from *boring* to *absorbing*);
- Significance (from *insignificant* to *significant*);
- Visual appeal (from *visually unappealing* to *visually appealing*);
- Accessibility (from *easy to follow* to *difficult to follow*); and
- Length (from *too short* to *too long*).

Story format affected respondents' perceptions of length, but it did not affect their judgments of accessibility, reliability, interest, significance, or visual appeal.

Perhaps unsurprisingly, respondents' perceptions of a story's length and its accessibility were also related. Perceptions of difficulty accounted for 14% of the variance in perceptions of length.

Engagement & Learning More

We also asked participants to rate their interest in learning more; their plans to learn more; and their willingness to share the story with others on social media, in conversation, and by email.

Unsurprisingly, interest in learning more and plans to learn more were closely related ($r = 0.85$). All three measures of

willingness to share were also closely related to one another, with correlation coefficients between 0.75 and 0.78.

A larger proportion of respondents said they were interested in learning more, than said they planned to learn more (Table 12). They were most likely to say they would describe the story to someone, then share it on social media, and least likely to say they would email the story.

Table 12. Responses to statements about engagement and learning more

	Disagree	Neither	Agree
I am interested in learning more about this topic.	11%	18%	71%
I plan to seek out more information about this topic.	19%	25%	57%
I am likely to share this story on social media.	28%	21%	51%
I am likely to describe this story to someone.	19%	22%	59%
I am likely to email this story to someone.	32%	24%	44%

Note: $N = 198$ for the first three statements, $N = 199$ for the final two. For all five statements, *Strongly disagree* and *disagree* responses were collapsed into a single category, as were *strongly agree* and *agree*. All responses have been rounded to the nearest whole percent.

RELEVANCE OF THE STORY

Research suggests that one of the reasons why younger people consume less news is that they find news content largely irrelevant to their lives. In one survey, 68% of Millennials gave media coverage of their generation a grade of C or below (Poindexter 2012, cited in Lee & Chyi, 2014). A recent study (Lee & Chyi, 2014) proposed the related concept of *noteworthiness*, defined as *the integration of two elements: relevance and interestingness*. That study found that the percentage of content a respondent designated noteworthy predicted enjoyment from news as well as time spent reading the newspaper, watching TV news, and getting news online.

We asked respondents whether they found the story they saw relevant to them and why, in order to determine whether

perceived relevance impacted their reactions. In response to a yes-no question about whether they found the story relevant to them, participants were almost evenly split: 100 said yes, while 99 said no. Responses were similar for all four versions of the story.

Comparison to First-Wave Data

In the first wave of the survey, 97 of these respondents (48.7%) reported knowing someone who had taken a prescription painkiller not prescribed to them, 84 of them (42.2%) reported knowing someone addicted to painkillers and 33 of them (16.6%) reported knowing someone who died of an overdose. In total, 112 people (56.3%) reported at least one of these types of personal connection, with an additional 12 respondents choosing not to respond to at least one of the questions.

Of the respondents who reported knowing someone connected to opioids in the first wave of the survey ($n = 112$), 69 of them reported finding the story relevant. Of those who did not report a personal connection in the first wave ($n = 75$), only 25 individuals reported finding the story relevant. The difference between these two groups was significant at $p < 0.0005$, with a medium effect size, explaining 5.6% of variance.

Similarly, all three sub-questions had an effect that was statistically significant at $p < 0.05$, with a larger effect size for knowing someone who takes prescription painkillers, and smaller effect sizes for knowing an addict or someone who had overdosed.

Reasons for Relevance & Irrelevance

For an open-ended follow-up question about relevance, the researchers developed a series of eight codes (Table 13) to capture responses to this question.

Table 13. Relevance codes and descriptions.

Code	Description
General	The topic is generally relevant or mention of the magnitude of the problem
Pain	The respondent is in pain, has a chronic illness, or knows someone who does
Drugs	The respondent takes medication or uses drugs, or knows someone who does
Addiction	The respondent is or has been an addict or drug abuser, or knows someone who is
Circle	The problem is relevant to the participants' social circle without specifying any of the above reasons
Interesting	The topic is interesting (rather than necessarily relevant)
Healthcare	The participant works in healthcare or rehab, or knows someone who does
Local	The participant lives in an area where the epidemic is of particular concern

Each response received one of three values in each of the eight categories. A '0' meant the code was not applicable. A '+' meant the code was specifically mentioned as a reason for relevance, and a '-' meant the code was specifically mentioned as a reason for irrelevance (Table 14).

Table 14. Relevance codes and example responses.

Code	Positive example	Negative example
General	<i>I think that people should be informed</i>	n/a
Pain	<i>I have relatives who are in pain</i>	<i>I am one of those people who doesn't have chronic disease or suffer from pain</i>
Drugs	<i>I've been debating on taking painkillers or not</i>	<i>I am not a drug user</i>
Addiction	<i>I have had family members and friends struggle with opioids.</i>	<i>To my knowledge I've never known anyone with an opioid addiction.</i>
Circle	<i>Family member</i>	<i>Doesn't really pertain to my life or anyone I know</i>
Interesting	<i>It is interesting to learn about</i>	<i>Not that much interest in the subject</i>
Healthcare	<i>I'm in nursing school</i>	n/a
Local	<i>Because the opioid crisis affects a lot of people living in my neighborhood</i>	<i>I don't live in the area</i>

Some responses were ambiguous, particularly those including variants of *use opioids* or *take opioids*. The researchers decided to code these conservatively as 'Drugs' rather than 'Addiction' unless the context made an addiction interpretation very clear. A number of respondents wrote in *N/A* or *none* or left this question blank, with 24 responses receiving a 0 across all eight categories.

Among the 175 respondents whose answers were coded, the most common reasons they found it relevant were general (General, $n = 29$, and Interesting, $n = 23$). Suffering from addiction or knowing someone who had ($n = 20$) was the next most common reason. Meanwhile, the most common reasons cited by respondents who found the stories irrelevant were not taking drugs or knowing anyone who did ($n = 54$) and not being addicted or knowing anyone who was ($n = 23$). Table 15 summarizes these results.

Table 15. Count of responses in each relevance category.

Code	-	0	+
General	1	145	39
Pain	2	168	5
Drugs	54	115	6
Addiction	23	132	20
Circle	9	157	9
Interesting	2	150	23
Healthcare	0	171	4
Local	1	167	7

Note: $n = 175$.

Interestingly, discourses of morality appear to play a role in respondents' determination of the story's relevance. A number of those who saw the story as irrelevant described their reasons in moralizing terms. For example, one participant wrote, *I don't associate myself with addicts*. Another answered, *[...] I've never done drugs and will never do drugs and I have no one in my personal life that does any such drugs*. Given that many responses were indeterminate, the researchers did not attempt to quantify these comments.

Relevance & Reactions to the Story

While format did not impact respondents' judgments of a story's reliability, interest, significance, or visual appeal, perceived relevance had statistically significant impacts on all of these aspects of stories when controlling for format. Furthermore, relevance also affected interest in learning more; plans to learn more; and willingness to share the story with others on social media, in conversation, and by email.

Size of Effects

Relevance impacted reactions to varying degrees. In some cases, perceived relevance had a very large effect; in other cases, the impact was modest. These results are summarized in Table 16.

Semantic differential scales: Relevance had a large effect on judgments of interest and significance. The effect on reliability was also moderate. On the other hand, effect sizes were fairly small for visual appeal.

Learning more: Because interest in learning more and plans to learn more were highly correlated ($r = 0.85$), we considered them in combination as well as individually. Story format did not have a statistically significant effect, while perceived relevance was not only statistically significant but had a very large effect size.

Willingness to share: Similarly, all three measures of willingness to share were highly correlated ($0.75 \leq r \leq 0.78$ for all three pairs), so we consider them together as well as individually. Once again, story format has no effect, while perceived relevance has a very large effect. The effect of perceived relevance on each individual type of sharing varies, but all are fairly large.

Table 16. Effect size of perceived relevance on reactions.

	Effect size	Explained variance
Easy to follow ... difficult to follow	n/a	n/a
Too short ... too long	Small	3.6%
Visually unappealing ... visually appealing	Small	4.6%
Unreliable ... reliable	Moderate	7.4%
Boring ... absorbing	Large	11.4%
Insignificant ... significant	Large	11.1%
Interest in learning more and plans to learn more (combined)	Very large	21.4%
I am interested in learning more about this topic.	Very large	17.9%
I plan to seek out more information about this topic.	Very large	21.2%
Likelihood to share (combined)	Very large	21.3%
I am likely to share this story on social media.	Large	10.3%
I am likely to describe this story to someone.	Very large	18.6%
I am likely to email this story to someone.	Very large	17.2%

Note: This table measures the effect size of relevance, controlling for story format only. Explained variance here refers to partial η^2 , an estimate of effect size for ANOVA. We consider an explained variance of 5% or less a small effect, between 5% and 10% a moderate effect, between 10% and 15% a large effect, and larger than 15% a very large effect.

NEW LEARNING

Of the 199 respondents, 142, or nearly three-quarters of them, said they had learned something new from the story.

Out of 100 participants who found the story relevant, four-fifths said they learned something new ($n = 79$). Meanwhile, for the 99 participants who did not find the story relevant, only two-thirds ($n = 63$) said they learned something new. This difference was significant at $p < 0.05$, but with a relatively small effect size, explaining only 2.4% of variance. The researchers believe that those who found the story irrelevant may simply have paid less attention to it.

Comparison to First-Wave Data

In the first wave of this study, participants were asked to self-report their knowledge about the opioid epidemic. There was no relationship between self-reported knowledge in the first wave and reporting learning something new in the second wave.

However, people who self-reported high knowledge in the first wave were more likely to say the story they read or watched was relevant to them, significant at $p < 0.0005$. The effect size was also quite large: each additional level of self-reported knowledge meant between an additional 7% and an additional 15% likelihood that the respondent would find the story relevant.

MYTHS & MISCONCEPTIONS

Respondents in the second wave were asked to respond to seven of the nine statements from the first wave. We did not include the two statements on insurance coverage since the content presented in the four segments did not directly touch on this topic.

There were statistically significant differences in responses to two of the seven statements between the pre- and post-surveys: *Pain is complex, with physical and psychological components* and *If you flush medicine down a toilet or throw it away, it can end up in drinking water*. In both cases, participants in the post survey were more likely to agree with these true statements, significant at $p < 0.05$.

Opioid Epidemic News Consumption

NewKnowledge Publication #NSF.100.183.05-R01

NEWS CONSUMPTION HABITS

We asked respondents to rate their agreement with four statements:

- I make a point of actively seeking out news;
- News finds me; I don't find it;
- Following the news is important to me; and
- If something is important, I will hear about it one way or another.

The majority see themselves as active news consumers, with two-thirds ($n = 133$) agreeing that they actively seek out news, and a similar number ($n = 136$) stating that following the news is important to them. However, respondents were split as to whether they find news or it finds them (Table 17).

Table 17. Responses to statements about news seeking behavior.

	Disagree	Neither	Agree
I make a point of actively seeking out news.	16%	17%	67%
News finds me; I don't find it.	36%	27%	37%
Following the news is important to me.	13%	19%	69%
If something is important, I will hear about it one way or another.	5%	14%	81%

Note: $N = 199$ for all statements except "News finds me; I don't find it" for which $n = 198$. All responses have been rounded to the nearest whole percent.

Respondents who agreed with either or both of the two statements indicating active news consumption were more likely to say they found the story relevant, significant at $p < 0.0005$. Effect sizes were quite large, with each additional level of agreement adding between 9% and 19% likelihood of finding the story relevant.

We also asked an open-ended question to provide context to these statements. Many of the responses reiterated the text of the statements. As a result, the researchers developed a non-exhaustive coding scheme to capture new information exclusively. There were four codes, and each response received a simple yes/no coding for each (Table 18).

Table 18. News-seeking codes and descriptions.

Code	Description
Moral	The respondent sees being informed as a moral obligation
Depressing	News is negative or upsetting
Distrust	News is untrustworthy
Topic	The respondent only seeks out news on a particular topic or topics, or news they find personally relevant

Moral obligation was by far the most common of these responses, found in 62 responses. The others were found in 12, 5, and 14 responses respectively.

The ideas that news is depressing and that news media are not to be trusted seem to exert an opposite pressure to the moral obligation to be informed. Three respondents noted that they had to balance this sense of obligation with an overwhelming sense of negativity. *I try to follow the news without exhausting myself and my emotional resources but I do find it very important to keep up to date*, one wrote. A second participant cited this same need for equilibrium: *[...] I want to know what is going on in the world, but not get too emotionally stressed about it, so I don't read too much into serious (bad) news.*

SCIENCE IDENTITY

In the Year 2 Transmedia Report (Roberts et al., 2017, NewKnowledge Publication #NSF.100.183.04), we found that science identity was a consistent predictor of judgments about interest, accessibility, and length.

As with the Mechanical Turk panel, we saw a wide range of responses to the science identity scale, with most respondents falling somewhere in the middle, between 2 and 4 on a 5-point scale.

Controlling for story format, science identity predicted perceived relevance, explaining 7.8% of the variation in responses. Since perceived relevance impacted most other reactions, we controlled for relevance when testing the effect of science identity. We also controlled for format since our original hypothesis was that format would be relevant.

Science identity did not predict judgments of length when controlling for relevance and format. On the other hand, science identity did predict every other reaction, and effect sizes were as large as for relevance or even larger for all reactions except for reliability and significance.

Table 19 summarizes these results.

Table 19. Variance explained by science identity, relevance, and format on all reactions.

	Science identity	Relevance	Format
Easy to follow ... difficult to follow	1.3%	n/a	n/a
Too short ... too long	n/a	2.9%	4.1%
Visually unappealing ... visually appealing	12.7%	n/a	n/a
Unreliable ... reliable	1.5%	4.7%	n/a
Boring ... absorbing	8.6%	6.2%	n/a
Insignificant ... significant	3.2%	7.1%	n/a
Interest in learning more and plans to learn more (combined)	21.6%	12.8%	n/a
I am interested in learning more about this topic.	10.8%	10.8%	n/a
I plan to seek out more information about this topic.	21.1%	12.1%	n/a
Likelihood to share (combined)	30.4%	13.0%	n/a
I am likely to share this story on social media.	20.3%	3.4%	n/a
I am likely to describe this story to someone.	13.7%	11.3%	n/a
I am likely to email this story to someone.	29.6%	8.5%	n/a

Note: Grey indicates statistically significant predictors. Explained variance here refers to partial η^2 , an estimate of effect size for ANOVA. We consider an explained variance of 5% or less a small effect, between 5% and 10% a moderate effect, between 10% and 15% a large effect, and larger than 15% a very large effect.

Interactions Between Science Identity & Relevance

We had hypothesized previously (Roberts, et al., 2017) that perceived relevance would have a larger effect for respondents with low science identity. To test this hypothesis, we considered interaction effects. Relevance and science identity did interact, but only for a small set of variables, namely perception of significance and likelihood to share. In all cases, relevance was more important for low science identity respondents than those with high science identity, as hypothesized.

Table 20. Variance explained by interaction between science identity and relevance.

	Variance explained by interaction
Insignificant ... significant	4.5%
Likelihood to share (combined)	8.1%
I am likely to share this story on social media.	n/a
I am likely to describe this story to someone.	5.2%
I am likely to email this story to someone.	3.8%

Note: Grey indicates a statistically significant effect. All of these effect sizes also control for format. Explained variance here refers to partial η^2 , an estimate of effect size for ANOVA. We consider an explained variance of 5% or less a small effect, between 5% and 10% a moderate effect, between 10% and 15% a large effect, and larger than 15% a very large effect.

Discussion

NEWS SOURCES

In the first wave, we saw that the less news respondents got about the epidemic, the more likely they were to consider medical information sources when learning about the problem (e.g., a doctor, WebMD, the CDC) – and the less likely they were to say they would go to journalistic sources.

These data may suggest that people unfamiliar with the epidemic are most interested in basic information that remains relatively static over time – e.g., what opioids are, what the epidemic refers to – that medical sources could easily provide. Meanwhile, those who are following the topic may be more interested in the up-to-the-minute coverage they would receive from reportorial sources instead.

Given the pervasiveness of news on the opioid epidemic, these data may also reflect either distrust of news media or general disinterest in news. That is, respondents who had not received information about the epidemic recently may simply be those who choose not to consume news regularly.

THE VALUE OF RELEVANCE

We know from previous project research (Roberts et al., 2017) that appealing to this audience requires a hook that communicates relevance at the very beginning. The results of the post survey confirm the research team's hypotheses, namely, that early career adults prefer stories they perceive as relevant, and that this sense of relevance is more important than story format.

While format impacted participants' assessments of a story's length and difficulty, format did not impact other reactions. Meanwhile, perceived relevance had an effect on these variables, often a quite large effect. Furthermore, for several variables, relevance was more important for respondents with low science identity than those with high science identity, as previously hypothesized.

Since audience interest in learning more and in sharing stories are both associated with perceived relevance, the

research team continues to anticipate that explicitly articulating relevance should increase these responses.

Questions remain about how, precisely, early career adults come to see a story as relevant or irrelevant to them. However, qualitative questions in this study provide several promising avenues for further research.

Broad & Narrow Relevance

In coding the relevance data, the researchers observed a trend that suggests interesting possibilities for deepening our research. There appear to be two ways of conceptualizing relevance: a broad view and a narrow view. The narrow view sees a story as irrelevant if there is no immediate personal connection; the broad view understands a story of general human interest as relevant. The researchers hypothesize that early career adults who take a broad view of relevance may be more likely to consume news in general, and that appealing to more narrow views may increase news viewership.

However, we did not attempt to code and quantify responses as broad or narrow because we did not have sufficient information to do so without skewing our responses towards the narrow view. In particular, the researchers found indeterminacy in responses that said the story was relevant and claimed a narrow reason. That is, at least some respondents who described a story as relevant for narrow reasons may still have found it relevant in the absence of those reasons. As a result, researchers do not yet know who is most likely to have a narrow view. Further study is needed to discern more about this population and how to design STEM news stories to engage them. Opportunities to pursue this line of inquiry are below.

Morality & Relevance

The research team has hypothesized that moral framing may increase the perceived relevance of a story. Some respondents found the story relevant for precisely this reason, describing a moral imperative either to be informed

about an issue they saw as a large problem or to act on it. A typical comment along these lines was, *I think this is a problem in America so that affects me, it doesn't have a personal effect because I don't know anyone with this issue, but we all need to do something about this, it's taking over.*

However, moral framing may be a double-edged sword. Many respondents who saw the story as irrelevant to them also couched their explanation in moral terms. Rather than indicating a moral imperative, these explanations typically indicated distance from the problem. *I don't use illegal drugs ever*, one wrote. Other responses exemplifying this type of moral response were *I don't deal with people using opioids* and *I have no opioids allowed at my home.*

Given the brevity of responses, the researchers did not attempt to quantify the frequency of either type of moral response. Future research should consider how explicit moral framing of news stories impacts the perceived relevance of those stories among the audience of early career adults. We further hypothesize that framing a story in terms of a moral imperative will be much more likely to increase viewers' perception of a story's relevance only if the story also includes specific actions to be taken.

Morality & News Consumption

A recent Pew report (Funk, Gottfried, & Mitchell, 2017) notes that 48% of American adults cite *a civic or social obligation to be informed* as one of the reasons they consume science news, and 74% of Millennials cite civic motivations among their reasons for news consumption (Media Impact Project, 2015). We saw precisely this moral claim in an open-ended question about active news-seeking behavior, where about one-third of respondents identified *being informed* as a value that influences their news consumption. This orientation towards being informed may be associated with the broad approach to relevance. That is, we expect that people who see *being informed* as inherently positive or important may also be more likely to see more content as relevant. Ongoing project research will explore this relationship.

RELEVANCE FOR EARLY CAREER ADULTS

We know from previous project research (Roberts, et al., 2017) that appealing to this audience requires a hook that

communicates relevance at the very beginning. To write story hooks that emphasize relevance for the audience of early career adults, we need to answer another question: what does this audience find relevant? We concern ourselves here particularly with those who take the more narrow view, and suggest several possibilities to explore in more depth:

Actionable Stories

The last time they looked into something online, Millennials are equally likely to have explored a “news-you-can-use” story as a hard news story (Media Insight Project, 2015). Taken together, these results suggest that a story's actionable take-aways may be a hook that appeals particularly to Millennials.

Future-facing Stories

Due to their age, this generation may also be more interested in long-term effects than older generations are. Future-facing hooks that consider the possible consequences or outcomes of a STEM story may be particularly effective with this audience.

Millennials in the US are particularly concerned with inequality, government accountability, climate change, and healthcare (World Economic Forum, 2017). Making explicit ties between STEM stories and these concerns, particularly over the long term, is also likely to improve early career adults' perception of relevance.

Representation of Youth

Newsrooms have long sought to increase diversity along racial, ethnic, and gender lines in staffing (see, e.g., Glasser, Awad, & Kim, 2009; Nishikawa, Towner, Clawson, & Waltenburg, 2009), largely to ensure that their content encompasses the perspectives of these groups. Similarly, early career adults may be more likely to see stories as relevant if they see their peers represented in the story. That includes representation as reporters, as scientists or other experts, or in “person-on-the-street” interviews discussing the story's likely impact.

The Importance of Place

A number of respondents found the story they viewed relevant or irrelevant depending on whether it was an issue for their local area. Other studies have found similar results (Fraser, et al., 2014). While this recommendation may be difficult for a national program like NewsHour to implement, ensuring that stories represent multiple regions will encourage audiences to interpret those stories as relevant.

Conclusion

The first wave of this two-wave study explored respondents' knowledge about the opioid epidemic, direct personal connections to it, perceived knowledge about the epidemic, and news consumption relating to the epidemic. In the second wave, we asked a subset of those respondents to view one of four news stories about the epidemic and react to it, as well as responding to several statements about their science literacy. We also compared respondents' knowledge between the two waves.

Between the first and second wave, respondents became more knowledgeable about two of the seven topics tested in both waves: the complexity of pain, and the possibility of medication contaminating drinking water.

Almost none of the differences among respondents' reactions could be attributed to which story the individual was asked to read or watch. Instead, this report provides quantifiable evidence for our earlier hypothesis that a story's perceived personal relevance would be of particular importance for news consumers who do not report a strong science identity. It also provides some preliminary ways of categorizing perceptions of relevance and understanding what motivates them.

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New Knowledge Organization Ltd.

Facing Society's Grand Challenges Head On

tel: (347) 766-3399
40 Exchange Pl. Suite 1403
New York, NY 10005

tel: (442) 222-8814
3630 Ocean Ranch Blvd.
Oceanside, CA 92056

tel: (240) 639-1177
P.O. Box 30273
Bethesda, MD 20824