HACKING YOUR MIND

Research Study Report

October 2020

Prepared for

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About RMC Research

With decades of experience in education, arts, humanities, and healthcare RMC Research engages with clients to measure their effectiveness and meet their goals to create opportunities for families, schools, and communities.

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Executive Summary

On October 1, 2015, Oregon Public Broadcasting (OPB) was awarded a 3-year grant of 2.7 million dollars from the National Science Foundation (NSF) to fund the project Hacking Your Mind (award number 1515520). A major public and social media project, Hacking Your Mind (HYM) planned to engage Americans with the new discoveries being made in the social, behavioral, and economic sciences and the remarkable insights these discoveries offer into how individuals make numerous daily decisions and judgments, as well as the broader impact of this highly personal phenomenon on nearly every aspect of people's lives. The logic model in **Appendix A** shows the HYM resources, activities, intermediate outcomes, and long-term impacts. OPB planned to provide three primary products:

- A riveting, 4-part primetime public television special featuring top names in the social, behavioral, and economic sciences.
- A social media campaign to attract new and younger audiences.
- An experimental research study that would increase understanding of how participants learn in different informal settings and how learning varies by participant type.

HYM aimed to make two overall contributions to the field: (a) broadening access to and engagement in science, technology, engineering, and mathematics (STEM) learning, and (b) enhancing learning in informal STEM. Informal STEM learning environments and experiences provide a unique opportunity to spark interest and engagement in STEM that could lead to STEM careers. According to a 2017 report from the U.S. Bureau of Labor Statistics,[1] there were nearly 8.6 million STEM jobs in 2015. Both women and certain racial and ethnic groups are underrepresented in STEM careers. A 2017 NSF report[2] identified three underrepresented racial and ethnic groups in science and engineering specifically: Blacks, Hispanics, and American Indians or Alaska Natives; other sources[3] include Pacific Islanders. HYM plans to publish the results of this research study, which will provide critical information to informal science educators seeking to attract a broader audience to STEM, and help public media producers of informal science content — and the organizations that promote and disseminate the content — better understand which approaches are most effective. The social media campaign was launched in August 2020 and the 4-part primetime public television special premiered on September 9, 2020.

Research

The Portland office of RMC Research was contracted by OPB to conduct the accountability evaluation, the formative evaluation, and the experimental research study. RMC Research conducted an experimental research study in spring 2020. Participants were randomly assigned to three study conditions to address five research questions:

> **Research Question 1: Does a person who engages in low doses of the treatment (i.e., shorter viewing of program content) experience similar gains as someone who engages in higher doses of the treatment (i.e., longer viewing of program content)?**

[1]Fayer, S. Lacey, A., Watson, A., (2017). STEM Occupations: Past, Present, and Future. US Bureau of Labor Statistics. Spotlight on Statistics.

[2] National Science Foundation, National Center for Science and Engineering Statistics. (2017). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017.* Special Report NSF 17-310. Arlington, VA. Retrieved from www.nsf.gov/statistics/wmpd/.

[3]National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2011. *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*. Washington, DC: The National Academies Press. https://doi.org/10.17226/12984.

Research Question 2: Does a person who engages in low doses of the treatment (i.e., shorter viewing of program content) demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment (i.e., longer viewing of program content)?

Research Question 3: Does a person who engages in low doses (i.e., shorter viewing of program content) of the treatment demonstrate similar anticipated behavioral change as someone who engages in a higher dose of the treatment (i.e., longer viewing of program content)?

Research Question 4: Does a person who engages in low doses (of the treatment i.e., shorter viewing of program content) demonstrate similar STEM Interest as someone who engages in a higher dose of the treatment (i.e., longer viewing of program content)?

Research Question 5: Are youth more engaged in the social media clips than the full episode?

Each study group completed a preassessment, watched their assigned video(s), and completed a postassessment. There were three study groups:

- The first study group was a **high-dose** treatment group who watched the Overarching HYM clip and Episode 4 of HYM. This study condition reflects someone watching a teaser and then a full television show. This study group watched approximately 1 hour and 3 minutes of video.
- The second study group was a **medium-dose** treatment group who watched the Overarching HYM clip and three clips from Episode 4 with more specific examples of the HYM series content—"How Can We Save the Planet?," "Can Governments Hack Your Mind?," and "Can Cops Overcome Their Biases?". This study condition reflected someone watching a series of clips on Facebook. This study group watched approximately 14 minutes of video.
- The third study group was a **low-dose** treatment group who only watched the Overarching HYM clip. This study condition reflected someone watching one clip on Facebook. This study group watched approximately eight minutes of video.

Research Participants

The primary target audience for the HYM television series is the Public Broadcasting System (PBS) primetime television viewing audience. According to the PBS Research Audience Insight 2016 Annual Report,[4] the PBS primetime audience is older (median age of 65) and college educated (43% have a 4-year degree). To attract and engage a broader and younger audience, this research study focused on young adults aged 18–25 (i.e., older Generation Z and younger millennial participants). There were 128 participants in this study. The average age of the study participant was 24, 51% were female, 31% were a racial group that is underrepresented in STEM, and 75% self-identified as a science person. Participants represented 22 states across the country.

Findings

The hypotheses were not supported, but the analyses revealed thought-provoking findings. All three study groups (low dose, medium dose, and high dose) experienced content knowledge gains from pre-to-post, and the medium and high dose experienced significant gains. This is an unexpected positive finding because regardless of the length of time watching HYM, content knowledge increased. This finding is important to the informal science learning field, as these results suggest that shorter clips may be as effective as full episodes in increasing participants' content knowledge.

[4]PBS Business Intelligence Group. (2016). Audience Insight Report. Report can be retrieved at [https://support.whro.org/images/pdf/TV-Audience-Insights-2016.pdf].

HYM did not have an impact on participants' career interest in science nor their view of the relevance and importance of science; there was no change pre- to-post. While their overarching views of science did not change, all three study groups reported on the postassessment a strong interest in learning more about the field of decision science and the specific HYM topics.

All participants were engaged in the activity (watching HYM videos and clips) regardless of the study group. Contrary to our hypotheses, these results suggest that a young audience may be just as engaged in the full episode as they are when viewing the clips. This finding is important for OPB because it suggests that OPB could effectively engage a younger audience with either the shorter video clips or the longer format.

After watching the videos participants were asked if they plan to reflect on how to make decisions, discuss any of the topics with others, search for more information about one of the interviewed scientists, or search for more information about any of the topics. The low-dose participants were significantly less likely to indicate these actions as a result of participating. These findings suggest that although shorter content may deliver knowledge and engage audiences, longer exposure (i.e., at least 20 minutes) may make people more likely to take action.

There were key differences in the findings by subgroups. For example, non-science people showed significantly greater gains in interest in a career in science, attitudes about the relevance of science, and attitudes about the importance of scientific research than science people. Although HYM did not have an impact on these variables for all participants, the findings suggest that videos such as these may be effective at broadening interest and access to STEM for individuals who do not identify as science people.

In addition to having an impact on non-science people, HYM had a positive impact on science people. Science people scored higher on the content knowledge items on the preassessment and experienced greater gains in knowledge than the non-science people. Science people were more likely to demonstrate anticipated actions, expressed greater interest in learning more about decision science and HYM topics, and reported higher levels of engagement than non-science people. These findings have important implications for future research in informal science learning; in addition to an aggregate level analyses, the results should be analyzed by this type of subgroup variable.

Since women and certain racial and ethnic groups are underrepresented in STEM careers, the findings were analyzed by these subgroups. The findings indicate that HYM had a similar impact on females and males. An important distinction is that after watching the videos, females showed more interest in pursuing a career in social, behavioral, and economic sciences than males. HYM had a similar impact for people who are underrepresented in STEM and those who are not. One key difference was that participants underrepresented (UR) in STEM scored lower than non-underrepresented (non-UR) subjects on the pretest, but they experienced larger gains pre-to-post. These findings suggest that projects such as HYM could be an effective method for attracting a broader audience to STEM.

Limitations

Although post hoc corrections were applied for subgroup comparisons, the large number of inferential tests in this study increases the possibility of Type I errors (i.e., false positives). This is a common limitation of informal learning and K–12 education studies. The only way to address this type of limitation is to limit the number of constructs or greatly increase the sample size. Additionally, COVID-19 impacted recruitment and participation, raising the probability that the study was underpowered to detect significant differences. To address this limitation a larger sample size is needed. Due to these limitations, the results should be interpreted cautiously. Even with these limitations, this study has a

larger sample size than many studies conducted in this field and is unique in terms of using a random assignment design.

Introduction

On October 1, 2015, Oregon Public Broadcasting (OPB) was awarded a 3-year grant of 2.7 million dollars from the National Science Foundation (NSF) under the Research on Learning in Formal and Informal Settings division of the Advancing Informal STEM Learning (AISL) program (program solicitation NSF 15-593) to fund the project Hacking Your Mind (award number 1515520). According to the authors (2019), the AISL program:

> …seeks to advance new approaches to and evidence-based understanding of the design and development of STEM learning opportunities for the public in informal environments; provide multiple pathways for broadening access to and engagement in STEM learning experiences; advance innovative research on and assessment of STEM learning in informal environments; and engage the public of all ages in learning STEM in informal environments. (p. 1).

A major public and social media project, Hacking Your Mind (HYM) planned to engage Americans with the new discoveries being made in the social, behavioral, and economic sciences and the remarkable insights these discoveries offer into how individuals make numerous daily decisions and judgments, as well as the broader impact of this highly personal phenomenon on nearly every aspect of people's lives. The logic model in **Appendix A** shows the HYM resources, activities, intermediate outcomes, and long-term impacts. OPB planned to provide three primary products:

- A riveting, 4-part primetime public television special featuring top names in the social, behavioral, and economic sciences.
- A social media campaign to attract new and younger audiences.
- An experimental research study that would increase understanding of how participants learn in different informal settings and how learning varies by participant type.

HYM Impacts on the Informal STEM Learning Field

As shown in the HYM logic model (**Appendix A**), the project aimed to make two overall contributions to the field: (a) broadening access to and engagement in STEM learning, and (b) enhancing learning in informal STEM. Informal STEM learning environments and experiences provide a unique opportunity to spark interest and engagement in STEM that could lead to STEM careers. According to a 2017 report from the U.S. Bureau of Labor Statistics,[5] there were nearly 8.6 million STEM jobs in 2015. Both women and certain racial and ethnic groups are underrepresented in STEM careers. According to the NSF's (2017) *Women, Minorities, and Persons with Disabilities in Science and Engineering* report,[6]

[5]Fayer, S. Lacey, A., Watson, A. (2017). STEM Occupations: Past, Present, and Future. US Bureau of Labor Statistics. Spotlight on Statistics.

[6] National Science Foundation, National Center for Science and Engineering Statistics. (2017). *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017.* Special Report NSF 17-310. Arlington, VA. Retrieved from www.nsf.gov/statistics/wmpd/.

"The representation of certain groups of people in science and engineering (S&E) education and employment differs from their representation in the U.S. population. Women, persons with disabilities, and three racial and ethnic groups—Blacks, Hispanics, and American Indians or Alaska Natives—are underrepresented in S&E. While women have reached parity with men among S&E degree recipients overall, they constitute disproportionately smaller percentages of employed scientists and engineers than they do of the U.S. population. Blacks, Hispanics, and American Indians or Alaska Natives have gradually increased their share of S&E degrees, but they remain underrepresented in educational attainment and the S&E workforce. By contrast, Asians are overrepresented among S&E degree recipients and employed scientists and engineers." Page 2

While the 2017 NSF report identified three underrepresented racial and ethnic groups in science and engineering specifically—Blacks, Hispanics, and American Indians or Alaska Natives—other sources[7] include Pacific Islanders. HYM plans to publish the results of this research study, which will provide critical information to informal science educators seeking to attract a broader audience to STEM, and help public media producers of informal science content — and the organizations that promote and disseminate the content — better understand which approaches are most effective.

In the evolving landscape of social media, in which audiences become digital natives in their childhood and mature into adults, this project's findings will help producers determine how to ensure they capture and dialogue with this audience.

HYM Broader Impacts

In the proposal to the NSF, the broader impacts of HYM were detailed. The proposal explained how HYM would expose large public audiences to new social, behavioral, and economic sciences research, with direct and clear applications for various aspects of people's lives. This exposure will not only increase viewers' scientific literacy, it would improve their understanding of scientific research's importance for all Americans and the necessity of continued public support for such research. In addition, the project would expose youth — particularly underserved youth — to the relevance of social, behavioral, and economic sciences research to their own lives, and illuminate the many fascinating aspects of the professions that produced this research, thereby making careers in these fields more accessible and desirable. Moreover, the project would provide Americans of all ages additional tools that contribute to their effectiveness as both voters and advocates for public policies that incorporate social, behavioral, and economic science findings about how individuals make decisions. Finally, by exposing policymakers and thought leaders, who make up a sizeable portion of the PBS audience, to these novel discoveries, HYM could directly contribute to the creation of more effective laws and policies, and to policymakers' greater understanding of the critical importance of scientific research to American life.

Experimental Research Study

This report describes the methods and findings for the experimental research study conducted in spring 2020 by RMC Research Corporation. The study randomly assigned participants to three study conditions to address five research questions with young adults aged 18–25 (i.e., older Generation Z and younger millennial participants).

Research Question 1: Does a person who engages in low doses of the treatment experience similar gains as someone who engages in higher doses of the treatment?

[7]National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2011. *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*. Washington, DC: The National Academies Press. https://doi.org/10.17226/12984.

Research Question 2: **Does a person who engages in low doses of the treatment demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment?**

Research Question 3: **Does a person who engages in low doses of the treatment demonstrate similar anticipated behavioral change as someone who engages in a higher dose of the treatment?**

Research Question 4: **Does a person who engages in low doses of the treatment demonstrate similar STEM Interest as someone who engages in a higher dose of the treatment?**

Research Question 5: **Are youth more engaged in the social media clips than the full episode?**

Methods

This research used an experimental research design by randomly assigning participants to three study conditions. This section describes the methods used to address five research questions.

- **Research Question 1: Does a person who engages in low doses of the treatment experience similar gains as someone who engages in higher doses of the treatment?**
- **Research Question 2: Does a person who engages in low doses of the treatment demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment?**
- **Research Question 3: Does a person who engages in low doses of the treatment demonstrate similar anticipated behavioral change as someone who engages in a higher dose of the treatment?**
- **Research Question 4: Does a person who engages in low doses of the treatment demonstrate similar STEM Interest as someone who engages in a higher dose of the treatment?**
- **Research Question 5: Are youth more engaged in the social media clips than the full episode?**

Research Design 1: Pre-Post Design Measuring Overall Gains

In the first research design, RMC Research used a pre-post design to address **Research Question 1**, **Does a person who engages in low doses of the treatment experience similar gains as someone who engages in higher doses of the treatment?** In this design, all three groups completed a preassessment, watched their assigned HYM video(s), and completed a postassessment. The independent variable is HYM. The dependent variables are science interest, interest in a science career, and change in attitude about the relevance of science. The dependent content knowledge variables are: (a) awareness that there is a scientific field that studies human decision-making, (b) knowledge of autopilot thinking, (c) knowledge of Sesame Credit (only for medium- and high-dose groups), (d) understanding of bias, and (e) understanding of using social influence to change behavior. The hypotheses are:

Hypothesis 1: People in the high-dose treatment group will experience the greatest pre-to-post gains.

Hypothesis 2: People in the medium-dose treatment group will experience greater pre-to-post gains than the low dose group.

Hypothesis 3: All three study groups (high-dose, medium-dose, and low-dose) will experience significant gains pre-to-post.

An important aspect of this design is determining whether the social media clips can broaden access to the scientific content by creating an alternate informal learning environment (i.e., social media clips) that is more appealing to a younger audience, and then determining whether young adults can learn enough from one clip or if they need to watch several clips in order to demonstrate gains.

Research Design 2: Post-Only Design Measuring Content Knowledge

RMC Research used a post-only design to address **Research Question 2**, **Does a person who engages in low doses of the treatment experience demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment?** In this design, all three groups answered this open-ended question on the postassessment only: "What does it mean to hack a human's mind and why does it

matter?" The independent variable is HYM and the dependent content knowledge variable is knowledge of human decision-making. The hypothesis is:

> **Hypothesis 4:** The post scores for knowledge of human decision making will be similar across all three study groups with the high-dose group obtaining a slightly higher score.

Research Design 3: Post-Only Design Measuring Anticipated Behavior Change

RMC Research used a post-only design to address **Research Question 3, Does a person who engages in low doses of the treatment demonstrate similar anticipated actions as someone who engages in a higher dose of the treatment?** In this design, all three groups answered these questions on the postassessment only: "After watching these videos, do you plan to reflect on how you make decisions, discuss any of the topics with others, search for more information about one of the interviewed scientists, or search for more information about any of the topics?" The independent variable is HYM, and the dependent variable is anticipated actions. The hypothesis is:

> **Hypothesis 5:** The post scores for anticipated actions will be similar across all three study groups with the high-dose group obtaining a slightly higher score (i.e., more participants indicating that they will change their behavior).

Research Design 4: Post-Only Design Measuring STEM Interest

RMC Research used a post-only design to address **Research Question 4, Does a person who engages in low doses of the treatment demonstrate similar STEM interest as someone who engages in a higher dose of the treatment?** Participants answered questions pertaining to their interest in STEM. The independent variable is HYM, and the dependent variables are: (a) interest in learning more about decision science, (b) interest in pursuing a career in social, behavioral, and economic sciences, (c) interest in informal learning environments, (d) interest in informal learning activities, and (e) interest in learning more about the HYM topics. The hypothesis is:

> **Hypothesis 6:** The post scores for STEM interest will be similar across all three study groups with the high-dose group obtaining a slightly higher score.

Research Design 5: Post-Only Design Measuring Engagement

RMC Research used a post-only design to address **Research Question 5, Are youth more engaged in the social media clips than the full episode?** Participants answered questions pertaining to their engagement during the informal learning activity (i.e., watching the videos). The independent variable is HYM, and the dependent variable is engagement in the informal learning activity. The hypothesis is:

> **Hypothesis 7:** The low-dose and medium-dose treatment groups will report higher levels of engagement on the Engagement in Science Learning scale than those in the high-dose group.

The purpose of this design is to determine if our assumption that the younger audience will find the social media clips more engaging than the entire episode is accurate. If this hypothesis is not supported and the younger audience is just as engaged in the full episode as the clips, it will be important to investigate how to distribute the full episodes to a younger audience.

Participant Characteristics

The primary target audience for the HYM television series is the PBS primetime television viewing audience. According to the PBS Research Audience Insight 2016 Annual Report,[8] the PBS primetime audience is older (median age of 65) and college educated (43% have a 4-year degree). To attract and engage a broader and younger audience, this research study focused on young adults aged 18–25 (i.e., older Generation Z and younger millennial participants).

Power Analysis for Recruitment of Study Groups

Power analysis was conducted using the program G*Power to determine the minimal sample sizes required to detect small, medium, and large differences between the three treatment conditions. The power analysis was conducted on the *F* tests family, analysis of covariance (ANCOVA) statistical test, in which alpha was set to .05, power equal to .80 (the statistical test needing the largest sample size for these studies). Detecting a small effect size needed 788 participants in each condition, while detecting a medium effect size needed 128 in each condition and detecting a large effect size needed 52 in each condition. The project anticipated having a large effect on participants because the content in the HYM series would likely be new for the participants; therefore, at least 156 participants (52 per study group) were needed for the analyses. That said, experimental research studies are uncommon for informal STEM learning projects, so the anticipated effect sizes are largely unknown since effect sizes are based on findings from prior research.

Human Subject Protections

RMC Research filed the appropriate paperwork with the Portland State University Institutional Review Board in March 2020. RMC Research submitted an updated application in April 2020 to revise the study from an in-person format to an online format due to COVID-19. RMC Research received Institutional Review Board approval to commence the study on April 16, 2020.

Recruitment

RMC Research began recruiting participants for the research study as soon as Institutional Review Board approval had been received. Expecting attrition, RMC Research aimed to recruit at least 187 participants for the research study in order to ultimately meet the target of 156 participants. The recruitment period was open from April 20, 2020 to May 5, 2020. During this time RMC Research recruited participants across the United States using a variety of recruitment methods, including online classified services such as Craigslist, ULoop, Locanto, Nextdoor, and local organizations including Elevate, REAP Inc., and Self Enhancement, Inc. Individuals completed a Survey Monkey survey that included three questions to screen for eligibility.

Eligibility Screening Criteria

1. What is your age?

> *Because the study intended to reach a younger audience, preference was given to those aged 18–25, though older participants could participate.*

[8]https://support.whro.org/images/pdf/TV-Audience-Insights-2016.pdf

2. How often do you watch public television (e.g., PBS, OPB, PBS Kids, etc.)? Please pick one answer.
    a. I have never watched public television.
    b. I used to watch public television but haven't lately.
    c. I watch public television about once a month.
    d. I watch public television about once a week.
    e. I watch public television daily.

> *Because the study intended to find individuals who were not typical public television viewers, people were eligible for the study if they answered 'a' or 'b'.*

3. What is your race/ethnicity? (Check all that apply.)
    a. American Indian or Alaskan Native
    b. Asian
    c. Black or African American
    d. Native Hawaiian or other Pacific Islander
    e. Hispanic or Latino
    f. White

> *The responses to this question were used as a stratum in the sampling to ensure diversity across the study groups and to oversample from groups underrepresented in STEM. No one was included or excluded based on their answer to this question.*

As shown in Exhibit 1, 415 individuals completed the eligibility survey, and 280 were in the target audience age range. Exhibits 2–3 show recruitment by subgroups.

Exhibit 1: Recruitment by Age Group

The recruitment effort exceeded the desired number of potential participants by age. There were 280 individuals in the targeted age range, when only 156 were needed.

Age Categories	No of Respondents
Under 18	3
18–25 (Target Audience)	280
26–29	47
30–39	55
40–49	22
50–59	7
60 and up	1
Total	415

Exhibit 2: Recruitment by Public Television Viewing

The goal was to recruit participants who had never, or not recently, watched public television. Of the 280 participants in the target age range, only 123 were in these categories. Therefore, the research team expanded the eligible subjects to include participants age 18–39 and those who watch public television approximately once per month. This expanded the potential pool of participants to 193.

Age Categories	Never	I used to but I haven't lately	Once per month	Once Per week	Daily
Under 18	1	1	0	1	0
Age 18–25 (Target Audience)	**7**	**116**	**26**	64	67
Age 26–29	**2**	**13**	**4**	13	15
Age 30–39	**4**	**15**	**6**	10	20
Age 40–49	1	7	4	5	5
Age 50–59	0	1	1	1	4
Age 60 and up	0	0	0	1	0
Total	15	158	41	95	111

Exhibit 3: Recruitment by Race

The highest number of respondents were White (n = 162) followed by Black (n = 75) and Hispanic (n = 73) respondents. Based on these data, all the Native American and Hawaiian respondents were ineligible for the research study because they watched too much public television. Those eligible for the research study are highlighted in yellow (n = 209).

Age Categories	Never	I used to but I haven't lately	Once per month	Once Per week	Daily	Total
White	**7**	**67**	**18**	36	34	162
Asian	**4**	**33**	**4**	13	12	66
Black	**1**	**17**	**9**	18	30	75
Multiracial*	**0**	**11**	**1**	7	11	30
Hispanic**	**3**	**23**	**8**	20	19	73
Persian	**0**	**0**	**1**	0	1	2
No Answer	**0**	**2**	**0**	0	0	2
Native American	**0**	**0**	**0**	0	4	4
Hawaiian	**0**	**0**	**0**	1	0	1
Total	**15**	**153**	**41**	95	111	415

Note: *Anyone noting more than one race was coded as multiracial. **Participants who responded as White and Hispanic were coded as Hispanic only.

Of the 415 respondents, 193 met the expanded age range of 18–39, 209 met the expanded desired public television viewing range (*never to monthly*), and of these, 193 respondents met both requirements. These 193 respondents comprise those invited to participate in the study.

Random Assignment

The 193 participants were randomly assigned to three study conditions (see Exhibit 4):

- The first study group was a **high-dose** treatment group who watched the Overarching HYM clip and Episode 4 of HYM. This study condition reflects someone watching a teaser and then a full television show. This study group watched approximately 1 hour and 3 minutes of video.
- The second study group was a **medium-dose** treatment group who watched the Overarching HYM clip and three clips from Episode 4 with more specific examples of the HYM series content—"How Can We Save the Planet?," "Can Governments Hack Your Mind?," and "Can Cops Overcome Their Biases?". This study condition represented someone watching a series of clips on Facebook. This study group watched approximately 14 minutes of video.
- The third study group was a **low-dose** treatment group who only watched the Overarching HYM clip. This study condition reflected someone watching one clip on Facebook. This study group watched approximately eight minutes of video.

Exhibit 4: Description of Study Groups and Minimum Sample Size Required

Study Group	Description	No. of Minutes of Video	Number of Participants
High-Dose	▶ Overarching HYM Clip (from Episode 1) ▶ Episode 4	63	52
Medium-Dose	▶ Overarching HYM Clip (from Episode 1) ▶ How Can We Save the Planet? Clip (from Episode 4) ▶ Can Governments Hack Your Mind? Clip (from Episode 4) ▶ Can Cops Overcome Their Biases? Clip (from Episode 4)	14	52
Low-Dose	▶ Overarching HYM Clip (from Episode 1)	8	52
Total			**156**

Note. RMC Research used the clips provided to RMC Research on March 25, 2020 and the episodes provided on May 6, 2020.

RMC Research utilized a stratified random assignment approach by dividing the entire sample frame into smaller subgroups, or strata, by race. This approach ensures there is equal representation by race across the three study groups. For each stratum, RMC Research randomly assigned participants to Study Group 1, 2, or 3 using the random number function in Microsoft Excel. The number of participants assigned to each study group and distribution of the study groups by race is shown in Exhibit 5. There were 70 individuals assigned to Group 1, 67 to Group 2, and 57 to Group 3 which is 36%, 35%, and 30% of the overall sample respectively.

Exhibit 5: Stratified Random Assignment by Race

Race	Number in Sampling Frame	Number Assigned to Study Group 1	Number Assigned to Study Group 2	Number Assigned to Study Group 3
White	89	33	31	25
Asian	39	13	13	13
Black	25	9	8	8
Multiracial[a]	10	3	4	3
Hispanic[b]	29	12	10	7
No response	2	0	1	1
Total	**193**	**70**	**67**	**57**

Note. The percentages are not equal because at the time of random assignment there were multiple entries for a single individual in the eligibility form. Primarily White individuals completed multiple entries of the eligibility form. The Research Team noticed the multiple entries during recruitment. Exhibit 5 reflects the sample after all duplicates were removed. This exhibit, and all previous exhibits reflect the actual data set with the multiple entries removed. Due to this issue, there are fewer White individuals in Group 3 and the total sample for Group 3 is smaller than the other study groups.

[a]Anyone noting more than one race was coded as multiracial.

[b]Participants who responded as White and Hispanic were coded as Hispanic only.

Description of Videos Used in the Study

RMC Research originally planned for the research study to include all four episodes of HYM, or at least several episodes whose content tested well in the 2019 formative evaluation.[9] After planning the research study in Year 5, RMC Research determined it would be too costly to replicate the study design for each of the four episodes. For example, if each episode were included in the research study, the total minimum sample size would need to be 624 participants (156 per episode), and the total cost of the research stipends alone would be $62,400. RMC Research considered having the high-dose treatment group view two episodes, but the data collection event would have lasted 3 to 3.5 hours; this is too burdensome for participants, and a lengthy data collection event could reduce the quality of the data due to participant fatigue. Based on these factors, RMC Research decided to use one episode: Episode 4, "The Wings of Angels." Episode 4 ,"The Wings of Angels" had the highest ratings for the tag lines in the 2019 formative evaluation and was interesting to a younger audience.

In regard to the social media clips, RMC Research originally planned to have a study group watch only one clip. When RMC Research watched the "How Can We Save the Planet" clip from Episode 4 and mapped the clip to the study outcomes, the video only addressed two outcomes. It would be a poor use of resources to create a study group with 52 people and only assess two outcomes. Therefore, RMC Research created a social media clip that was comprised of s of Episode 1, "Living on Auto-Pilot," ending at the 6:37 mark once the host sits down in the boat with the scientist. This clip, called "Overarching HYM," addressed several of the study outcomes and presented an overarching view of the HYM television series.

All three study groups (high-dose, medium-dose, and low-dose) watched the Overarching HYM clip from Episode 1. The Overarching HYM clip provided all three study groups with a brief overview of the HYM television series. The low-dose treatment group only viewed the Overarching HYM clip and no other videos. The medium-dose group watched the Overarching HYM clip and three clips from Episode 4 with

[9]Hiebert Larson, J., Lewis, C., & Del Core, C. (2019). *Hacking Your Mind: Formative Evaluation Report.* Portland, OR: RMC Research Corporation.

more specific examples of the HYM series content: "How Can We Save the Planet?," "Can Governments Hack Your Mind?," and "Can Cops Overcome Their Biases?". The high-dose group watched the Overarching HYM clip and all of Episode 4. Even though RMC Research created the Overarching HYM clip from Episode 1, RMC Research did not select Episode 1 for the research study because Episode 4 content tested better with younger audiences in the 2019 formative evaluation.

Instrument Development

In Year 5 the HYM project leadership and RMC Research developed one instrument for the research study that included a consent form, content assessment items, and survey items (see **Appendix B**).

Content Knowledge Items. These items measure participants'

- Awareness that there is a scientific field that studies human decision making,
- Knowledge of autopilot thinking,
- Knowledge of Sesame Credit,
- Understanding of bias,
- Understanding of using social influence to change behavior, and
- Knowledge of human decision-making.

Due to the specific nature of the content in HYM, all content assessment items were developed by RMC Research in collaboration with OPB and were aligned with the content presented in the videos selected for the research study. There was not an existing content assessment to measure these constructs.

Several of the content knowledge constructs have open-ended items including: (a) knowledge of autopilot thinking, (b) knowledge of Sesame Credit, (c) understanding of bias, (d) understanding of using social influence to change behavior, and (e) knowledge of human decision-making. For these constructs each open-ended response was coded as '1' for correct and '0' for incorrect.

The low-dose group did not watch videos that included content on Sesame Credit, understanding of bias, or understanding of social influences to change behavior. Questions pertaining to these topics were only included on the medium- and high-dose assessment.

The instrument was pilot tested with an individual in the target age demographic. The individual completed the assessments, after which RMC Research used a cognitive think-aloud approach to obtain feedback on various aspects of the instrument. The instrument was revised following this process.

> *These are items 7–19 on the PRE and 13–26 on the POST.*

Survey Items. RMC Research conducted an environmental scan to determine which instruments were available to measure the 10 constructs in Exhibit 6, including searching the resources in https://www.informalscience.org/. As shown in Exhibit 6, some of the constructs were measured with scales from prior research studies using reliable survey instruments (i.e., validated scales), while other scales were developed by RMC Research in collaboration with OPB. Scale reliability was assessed using Cronbach's alpha and is reported in **Appendix C** for all scales used in this report.

Description of Scales

Engagement in Science Learning Activities

The Engagement in Science Learning Activities scale was developed by the Science Learning Activation Lab. In the *Measures Technical Brief* (2016)[10] the authors described:

> We conceptualize engagement as one's focus, participation, and persistence on a task (Carini, et al., 2006; Finn, Pannozzo, & Voelkl, 1995; Fredricks, et al, 2004; Fredricks, et al, 2011). Following the research literature, within this conceptualization, we envision three dimensions of engagement: (1) behavioral engagement focuses on whether learner behaviors are related to completing the task or are off task; (2) cognitive engagement focuses on whether thought processes and learner attention are directed towards meaningful processing of information involved in completing the task; and (3) affective engagement focuses on whether the emotions that occur as part of completing a task are positive and high arousal rather than negative and low arousal. Research suggests that a combination of these three facets of engagement support students to learn (Dorph, et. al., 2013; Fredricks, et al, 2004). (p. 1)

Although this scale was developed for middle school students, RMC Research believed it would work well for this research study. Most research studies aim to develop instruments accessible at the Grade 8 reading level. The Engagement in Science Learning Activities scale has a Cronbach alpha of .80. The eight items in the scale are shown in Exhibit 6. The study authors encourage researchers to use an overall engagement score, a score for affective engagement, and a score for behavioral/cognitive engagement. Scores are created by generating an overall mean followed by a mean for each subscale. The authors note that once the scale is generated the average scores can be treated as continuous dependent or independent variables for *t*-tests, ANOVA, and regression-type analyses. The scale is intended to be used immediately after a science activity, whether in a class or an informal learning context. Using the scale in this way minimizes memory biases or inferences based on beliefs the learner has about themselves or the learning context. Therefore, it should be used after a focused science activity and not as a general measure of engagement over time. RMC Research changed the wording from *during this activity* to *during this video* and changed the response scale from *Yes!, yes, no, No!* to an agreement scale to match the response options on the HYM survey.

Exhibit 6: Engagement Survey Item Mapping

Item	During this video:	Scale Development
E01*	I felt bored.	Affect
E02	I felt happy.	Affect
E03	I felt excited.	Affect
E04*	I was daydreaming a lot.	Cognitive
E05	I was focused on the things we were learning most of the time.	Cognitive
E06	Time went by quickly.	Behavior
E07*	I was busy doing other tasks.	Behavior
E08*	I talked to others about stuff not related to what we were learning.	Behavior

*Reverse code

[10]Chung, J., Cannady, M. A., Schunn, C., Dorph, R., & Bathgate, M. (2016). Measures technical brief: Engagement in science learning activities. Retrieved from http://activationlab.org/wp-content/uploads/2018/03/Engagement-Report-3.2-20160803.pdf

These are items 1a–1h and 2 on the POST only.

Participant in Informal Learning Environments

If the participant indicates they visited any of the informal learning environments by marking yes for any item, they will be coded as 1: *Informal Learning Environment Participant*, and all others will be coded as 0.

These are items 1a–1d on the PRE only.

Participant in Informal Learning Activities

If the participant indicates they participated in any of the informal learning activities by marking yes for any item, they will be coded as 1: *Informal Learning Activity Participant*, and all others will be coded as 0.

These are items 2a–2f on the PRE only.

Interest in Informal Learning Environments

If the participant indicates they want to participate in any of the informal learning environments by marking yes for any item, they will be coded as 1: *Interested in Informal Learning Environments*, and all others will be coded as 0.

These are items 3a–3e on the POST only.

Changes in Attitude About the Relevance of Science (CARS)

In the article, *Developing the Changes in Attitude about the Relevance of Science (CARS) Questionnaire and Assessing Two High School Science Classes*, Siegel and Ranney (2016)[11] designed and tested an instrument to reflect changes in attitudes toward science over time. The authors developed a 59-item scale (Cronbach alpha .91) and three subscales (Cronbach alpha for each subscale was .80). Because the 59-item version would be too large for this research study, RMC Research selected the eight items that were common to each subscale. The original response options were: *strongly agree, somewhat agree, neutral, somewhat disagree, strongly disagree*, and *I don't understand*. RMC Research changed the response options to match the agreeability response options on the HYM survey.

These are items 3a–3h on the PRE and 9a–9g on the POST.

Importance of Scientific Research

If the participant indicates that scientific research is important by marking *agree* or *somewhat agree* they will be coded as 1: *Scientific Research is Important*, and all others will be coded as 0.

These are items 4a–4b on the PRE and 10a–10b on the POST.

[11]Siegel, M. A., & Ranney, M. A. (2003). Developing the Changes in Attitude about the Relevance of Science (CARS) questionnaire and assessing two high school science classes. *Journal of Research in Science Teaching, 40*(8), 757-775.

Interest in Informal Learning Activities

If the participant indicates they want to participate in any of the informal learning activities by marking yes for any item, they will be coded as 1: *Interested in Informal Learning Activities,* and all others will be coded as 0.

These are items 4a–4g on the POST only.

Interest in Learning More About HYM Topics

If the participant indicates they want to learn more about HYM by marking *agree* or *strongly agree* for any item, they will be coded as 1: *Interested in Learning More About HYM,* and all others will be coded as 0.

These are items 5a–5e on the POST only.

Interest in Learning More About Decision Science

If the participant indicates they want to learn more about decision science by marking *agree* or *somewhat agree* they will be coded as 1: *Interest in Learning More About Decision Science*, and all others will be coded as 0.

These are items 5a–5e on the POST only.

Career Interest in Science

In the *Test of Science-Related Attitudes Handbook*, Fraser (1981)[12] developed seven scales. The Career Interest in Science Scale is a 10-item scale (Cronbach alpha .85). The Career Interest in Science scale score is calculated as the mean of individual items for each participant. The original response options were *strongly agree, agree, not sure, disagree*, and *strongly disagree*. RMC Research changed the response options to match the response options on the HYM survey. Although this scale was developed for ages 7–12, RMC Research believed it would work well for this research study. As previously noted, most research studies aim to develop consent and utilize instruments designed at the Grade 8 reading level.

These are items 5a–5d and 6a–6d on the PRE and 11a–11d and 12a–12d on the POST.

Interest in Pursuing Social, Behavioral, and Economics Career

If the participant indicates they are interested in pursuing a career in STEM by marking *agree* or *somewhat agree* they will be coded as 1: *Interested in Pursuing a STEM Career*, and all others will be coded as 0.

This is item 6 on the POST only.

[12]Fraser, B. J. (1981). *Test of science-related attitudes (TOSRA) handbook*. Melbourne: Australian Council for Educational Research.

Anticipated Actions

These items ask about anticipated actions following the show such as, reflecting on their behavior, discussing the topic with others, searching for more information about the topic, searching for more information about the interviewed scientist, and searching for more information about the topic. These are modified items from a Radiolab evaluation conducted by Flagg (2009).[13]

These are items 7a–7d on the POST only.

Science Person

The Interest in Science scale was developed by the Cornell Lab of Ornithology for project DEVISE: Developing, Validating, and Implementing Situation Evaluation Instruments funded by the National Science Foundation (DRL# 1010744) and the Noyce Foundation. As noted in the instrument documentation (2014):[14]

> Interest in science is considered a key driver to pursuing science careers in youth (Tai, et al. 2006, Maltese and Tai 2010) and sustained lifelong learning and engagement in adults (Dabney et al. 2011, Falk, et al. 2007). We define interest as it relates to science and the environment as 'the degree to which an individual assigns personal relevance to a science topic, activity, environmental issue, or the scientific endeavor.' Over time, this type of interest can lead to sustained engagement, motivation, and can support identity development as a science learner (National Research Council 2009). (p. 1).

The Interest in Science scale includes 11 survey items with a 5-item Likert response scale (*strongly disagree, disagree, neutral, agree*, and *strongly agree*) with a reliability of .93. The survey was developed and tested in a variety of informal science learning settings. The Interest in Science scale score is calculated as the mean of individual Interest in Science items for each participant. Mean scores below 3 indicate low levels of interest in learning or doing science activities. The scale authors note that if the research/evaluation uses a pre-post design, the researcher should consider grouping participants by those who started out relatively low in interest and those who started out relatively high in interest. While it is reasonable to expect an increase in interest among participants who started out relatively low, a marked increase among those who started out highly interested would not be expected. The analyses should consider maintaining that high level as a positive outcome. To make the items more user friendly, RMC Research slightly modified the language of some items and combined two items: (a) "I want to learn more about the biological sciences (e.g. ecology, zoology, evolutionary biology)" and (b) "I am interested in learning more about the physical sciences (chemistry, physics, astronomy, and geology)" into one item: "I want to learn more about science." For this scale, and all other scales with agreeability response options on the HYM instrument, RMC Research changed the response options to *strongly disagree, disagree, agree, and strongly agree*.

These are items 8a–8k on the POST.

[13]Flagg, B. (2009). *Listeners' evaluation of Radiolab program: Choice* (Report No. 09-009). Belport, NY: Multimedia Research.

[14]Cornell Lab of Ornithology, Interest in Science, Adult Version. (2014). Survey Instrument Documentation. Retrieved from https://www.citizenscience.org/2014/09/12/evaluation-users-guide-to-evaluating-learning-outcomes/.

Gender

The research team created the variable *gender* by coding females as 1 and males as 0; those who responded *transgender* or *other*, gave multiple responses, or skipped this item will be excluded from sub-analyses by gender.

This is item 29 on the POST.

Underrepresented in STEM

Representation is an important variable in this research. According to the NSF's (2017) *Women, Minorities, and Persons with Disabilities in Science and Engineering* report:

> The representation of certain groups of people in science and engineering (S&E) education and employment differs from their representation in the U.S. population. Women, persons with disabilities, and three racial and ethnic groups—Blacks, Hispanics, and American Indians or Alaska Natives—are underrepresented in S&E. While women have reached parity with men among S&E degree recipients overall, they constitute disproportionally smaller percentages of employed scientists and engineers than they do of the U.S. population. Blacks, Hispanics, and American Indians or Alaska Natives have gradually increased their share of S&E degrees, but they remain underrepresented in educational attainment and the S&E workforce. By contrast, Asians are overrepresented among S&E degree recipients and employed scientists and engineers. (p. 2).

While the 2017 NSF report identified three underrepresented racial and ethnic groups in science and engineering specifically—Blacks, Hispanics, and American Indians or Alaska Natives—other sources[15] include Pacific Islanders. The research team created the variable *underrepresented in science race* (i.e., UR) by coding those identifying as American Indian or Alaska Native, Black or African American, Native Hawaiian or Other Pacific Islander, or Hispanic as 1 and all others as 0 (non-UR); those who skipped this item or who only selected *other* but wrote in a non-response (e.g., "not your business") will be excluded from sub-analyses by UR.

This is item 28 on the POST.

Location

The research team created the variable *location* by coding participants by their zip code. These data will be used to assess the diversity of the study sample in terms of where participants live.

This is item 30 on the post.

Data Collection

RMC Research planned to collect data through facilitated Zoom sessions. RMC Research anticipated 12 main data collection events: four events for each study condition in the research study. There would be approximately 12 people at each event. Make-up sessions were to be scheduled if the desired sample size was not attained at the main events. On May 12, 2020 RMC Research sent emails to individuals asking them to participate in the research study. The email asked participants to select one of the

[15]National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2011. *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*. Washington, DC: The National Academies Press. https://doi.org/10.17226/12984.

scheduled Zoom times for a group call, select their gift card of choice, read the consent form, and sign the consent form. Exhibit 7 shows the original data collection plan. On the day of the data collection events, participants would be asked to log on 20 minutes prior to the event if they needed assistance using Zoom. At the onset of the meeting the RMC Research facilitator would review the study and consent form. The RMC Research facilitator would then provide the participants with a link to complete the preassessment. After the preassessment was completed, the RMC Research facilitator would provide the participants with a second link that included the video. At the conclusion of the video a link would appear for the postassessments. At the conclusion of the event RMC Research would email participants a gift card to thank them for their time.

RMC Research learned several lessons during the data collection process that will inform future work:

- First, the recruitment emails were sent in late April. RMC Research had to leave the recruitment window open long enough to recruit the required sample size. A challenge was that by the time RMC Research recruited enough individuals and then randomly assigned the eligible individuals to study groups, it was a full month before RMC Research contacted them again to sign them up for a data collection Zoom call. For future studies, RMC Research recommends including the following information with the eligibility screener instead of waiting until a separate data collection email: select their gift card of choice, read the consent form, and sign the consent form.
- Second, it was extremely time-consuming to get people to sign up for a Zoom call, send reminders to individuals prior to the call, and reschedule those who did not attend. For future studies, RMC Research recommends allotting more time to participant tracking.
- Third, while RMC Research wanted to facilitate the Zoom calls in order to have greater control over the study conditions, it proved very difficult to get people to show up to the Zoom calls. Attendance at the data collection events was typically around 50%. RMC Research had to schedule more make-up Zoom calls than anticipated. Toward the end of the data collection, RMC Research shifted to sending the individual the presurvey via email. The participant sent an email once they had completed it, at which point RMC Research sent them the link to the video and postsurvey. The individual emailed RMC Research once they were done, and were sent a gift card. For future studies, it may be best to start with this type of approach so that data collection is more efficient; it would allow people to participate earlier in the process and at their convenience, rather than waiting for a scheduled call in the future.
- Fourth, RMC Research had not anticipated individuals attempting to participate multiple times nor sending the survey links to other people. As a result, RMC Research spent more time than anticipated cross-checking records to ensure the correct people were participating; this was exacerbated by people using different email addresses and different versions of their name (e.g., Charlie Parkins, C. Parkins, Chuck Parkins). For future studies RMC Research recommends allotting more time to participant-tracking.
- Fifth, RMC Research was surprised that it was difficult to find low-dose participants. RMC Research assumed that people would be hesitant to participate in the high-dose group due to the time commitment, but it seemed that people were less-inclined to participate in the low-dose group due to the smaller gift card amount. RMC Research had to dedicate extra staff time to solicit participants for the low-dose group. For future studies RMC Research recommends considering whether to offer all participants the same gift card amount regardless of time spent in the data collection activity.

Exhibit 7: Description of Data Collection Event Activities by Study Group

Study Group	Description of Data Collection	Total Time at Data Collection Event	Gift Card Amount
High Dose	▶ Consent and study overview (10 minutes) ▶ Presurvey (20 minutes) ▶ Watch Videos (63 minutes) ▶ Postsurvey (20 minutes) ▶ Gift Cards (10 minutes)	Approximately 2 hours	$160
Medium Dose	▶ Consent and study overview (10 minutes) ▶ Presurvey (20 minutes) ▶ Watch Videos (14 minutes) ▶ Postsurvey (20 minutes) ▶ Gift Cards (10 minutes)	Approximately 1 hour and 14 minutes	$100
Low Dose	▶ Consent and study overview (10 minutes) ▶ Presurvey (10 minutes) ▶ Watch Videos (8 minutes) ▶ Postsurvey (10 minutes) ▶ Gift Cards (10 minutes)	Approximately 45 minutes	$60

Analytic Sample

Of the 193 individuals contacted, 128 met eligibility criteria and completed pre- and/or postassessments and are included in the analytic sample. Exhibit 8 shows the number of individuals recruited per study group and the number in the final analytic sample. As shown, for each study group approximately 60–70% of those who were contacted completed the study. During data collection there was one participant who indicated they were 17 years old. This participant's data was removed from the analyses. This study did not reach 156 participants; therefore, the study is underpowered, and the results should be interpreted with caution. However, there is minimal experimental research being conducted in this area and this lays the groundwork for future studies.

Exhibit 8: Analytic Sample[a]

	Study Group 1: Low Dose		Study Group 2: Medium Dose		Study Group 3: High Dose	
Participant Group	***n***	**%**	***N***	**%**	***n***	**%**
Total Randomly Sampled						
Total Sampled	70	100%	67	100%	57	100%
Pre-Post Analytic Sample	41	59%	39	58%	41	72%
Post-Only Analytic Sample	41	59%	46	69%	41	72%
White Only						
Total Sampled	33	100%	31	100%	25	100%
Pre-Post Analytic Sample	19	58%	16	52%	15	60%
Post-Only Analytic Sample	19	58%	20	65%	15	60%
Asian Only						
Total Sampled	13	100%	13	100%	13	100%
Pre-Post Analytic Sample	8	62%	9	69%	6	46%
Post-Only Analytic Sample	8	62%	9	69%	6	46%
Black Only						
Total Sampled	9	100%	8	100%	8	100%
Pre-Post Analytic Sample	5	56%	6	75%	4	50%
Post-Only Analytic Sample	5	56%	6	75%	4	50%
Multiracial[b]						
Total Sampled	3	100%	4	100%	3	100%
Pre-Post Analytic Sample	4	133%	6	150%	6	200%
Post-Only Analytic Sample	4	133%	7	175%	6	200%
Hispanic[c]						
Total Sampled	12	100%	10	100%	7	100%
Pre-Post Analytic Sample	4	33%	2	20%	5	71%
Post-Only Analytic Sample	4	33%	4	40%	5	71%

Note. Six participants in the analytic sample did not provide their race or ethnicity. Total sampled uses the numbers from the recruitment data file (eligibility screener) and analytic sample uses the race/ethnicity reported during the research study on the postassessment. The total sampled percentage greater than 100% is due to differences in the files (e.g., duplicates, people marking a different race category).

[a]Race/ethnicity from the study screening questions were used for random sampling, whereas race/ethnicity for descriptions of the analytic sample were gathered via the study. Therefore, some participants may have given different answers on the two questionnaires, resulting in slight discrepancies in reporting.

[b]Anyone noting more than one race was coded as multiracial.

[c]Participants who responded as White and Hispanic were coded as Hispanic only.

Analytic Sample Pre-Post Design: Research Question 1

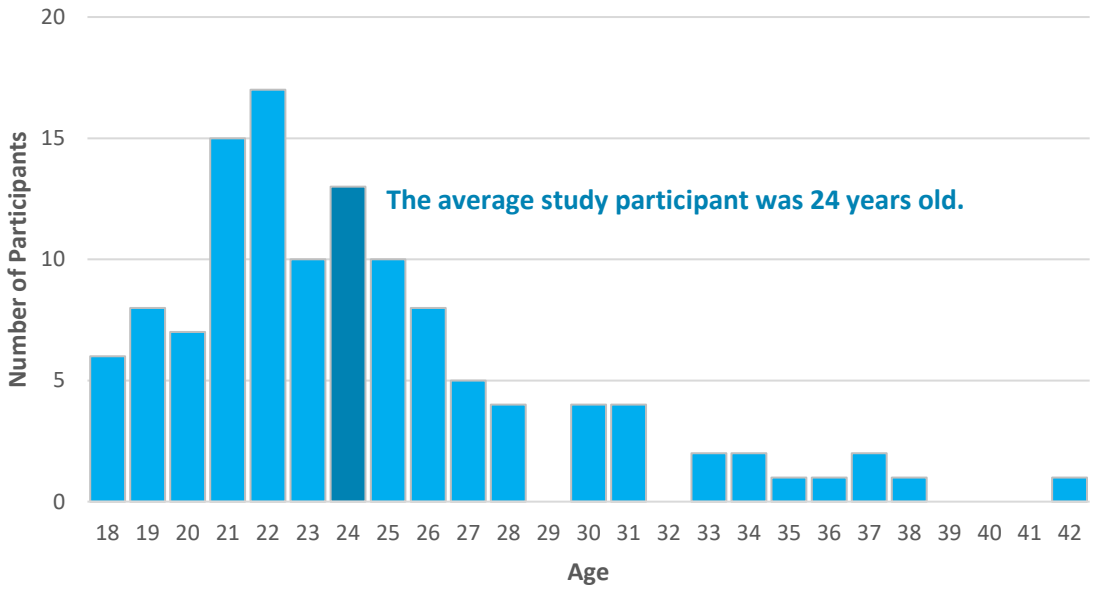
In the pre-post design, participants completed a preassessment, watched their assigned HYM video(s), and completed a postassessment. The 121 participants who completed both a preassessment and a postassessment were included in the pre-post analyses; seven participants in this research study only completed a postassessment and are therefore excluded from the pre-post analyses. Of the 121 pre-post participants, 41 were in the low-dose group, 39 were in the medium-dose group, and 41 were in the high-dose group.

The HYM study collected information about participants' age, gender, race/ethnicity, location, and interest in science. Using Chi-squared tests of homogeneity, there were no significant differences in these characteristics among participants in different study groups. Therefore, sample characteristics are described for the analytic sample as a whole throughout this chapter, rather than by individual study group (low-dose, medium-dose, or high-dose).

Pre-Post Study Sample Characteristics

Participants ranged in age from 18 to 42, with a sample mean age of 24 (see Exhibit 9).

Exhibit 9: Age of Study Participants

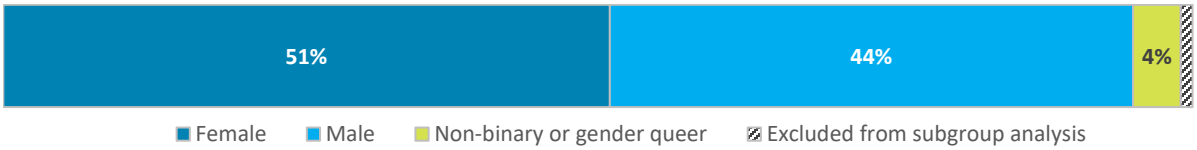


Note. n = 121.

Approximately half of the participants identify as cisgender or transgender female (51%); 44% identify as cisgender or transgender male; and 4% identify as non-binary or gender queer (see Exhibit 10). One response could not be coded ("heterosexual").

Exhibit 10: Gender of Study Participants

About half of the study participants identify as female.

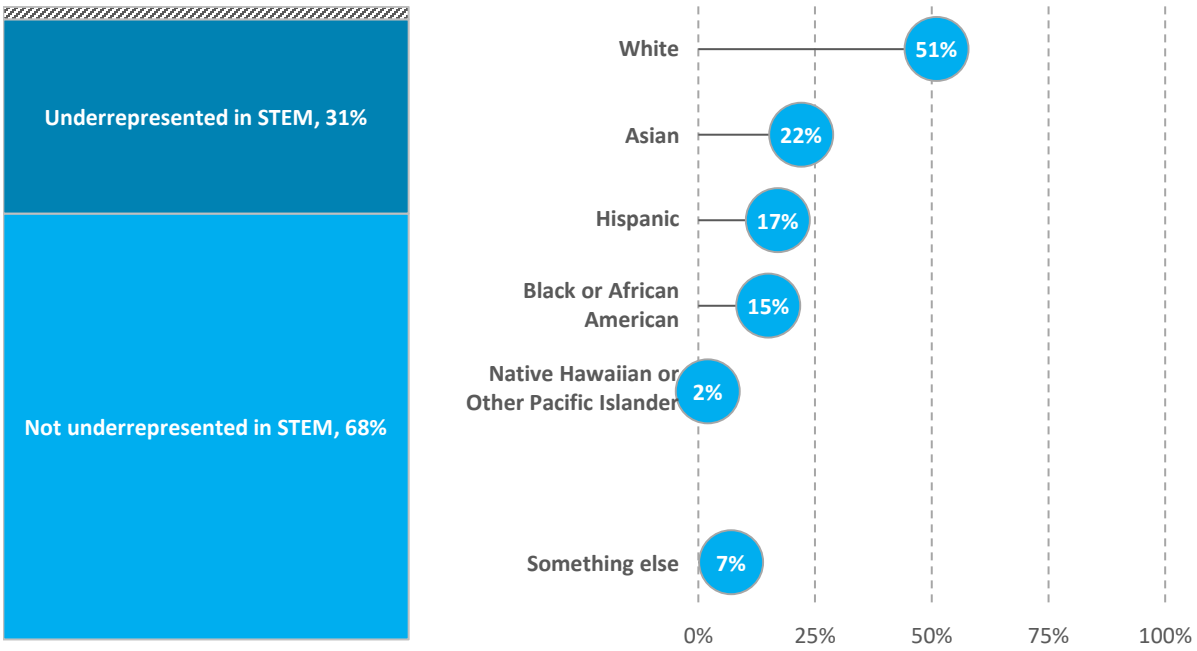


Note. n = 121.

Approximately half of the participants identify as White (51%); 22% identify as Asian; 17% identify as Hispanic; and 15% identify as Black or African American (see Exhibit 11). A smaller percentage identify as Native Hawaiian or other Pacific Islander (2%) or something else (7%). Although only two participants self-identified as *multiracial*, 16 respondents selected more than one race or ethnicity. Thirty-eight participants (31%) who selected American Indian or Alaska Native, Black or African American, Native Hawaiian or other Pacific Islander and/or Hispanic were coded as *underrepresented in STEM* (UR), while 82 participants (68%) who selected White and/or Asian were coded as *not underrepresented in STEM* (non-UR). Participants who responded only *multiracial* or *mixed* (*n* = 2, 2%) were omitted from the subgroup analyses, since they may or may not be in underrepresented racial or ethnic groups.

Exhibit 11: Race and Ethnicity of Study Participants

Nearly one-third of study participants are in a racial or ethnic group that is underrepresented in STEM.

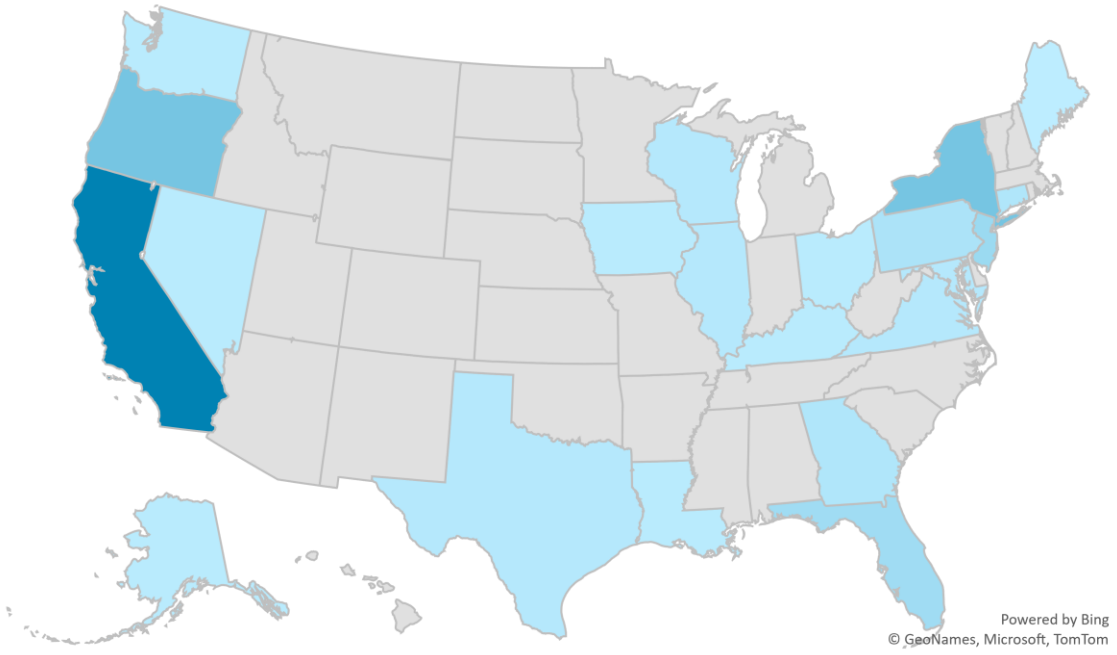


Note. n = 121.

Using participants' reported zip code, RMC Research found that study participants reside in 20 different U.S. states, with the most representation from California (*n* = 45, 37%), followed by New York and Oregon (*n* = 17, 14% for each; see Exhibit 12). Just over half of the participants are from the western United States (54%; as defined by the U.S. Census regions),[16] 26% reside in the northeastern United States; 15% reside in the South; and 5% reside in the Midwest. All participants reside in an urban area (as defined by RUCA codes).[17]

Exhibit 12: Location of Study Participants

Study participants reside in 20 different U.S. states. About half reside in the western U.S.



Note. *n* = 121.

Using the Interest in Science scale developed by the Cornell Lab of Ornithology (see **Appendix C**) to categorize participants as a *science person* or a *non-science person*, 74% of participants (*n* = 90) are classified as *science people* (see Exhibit 13).

Exhibit 13: Science People Versus Non-Science People

About three quarters of study participants are classified as "science people."

Note. *n* = 121.

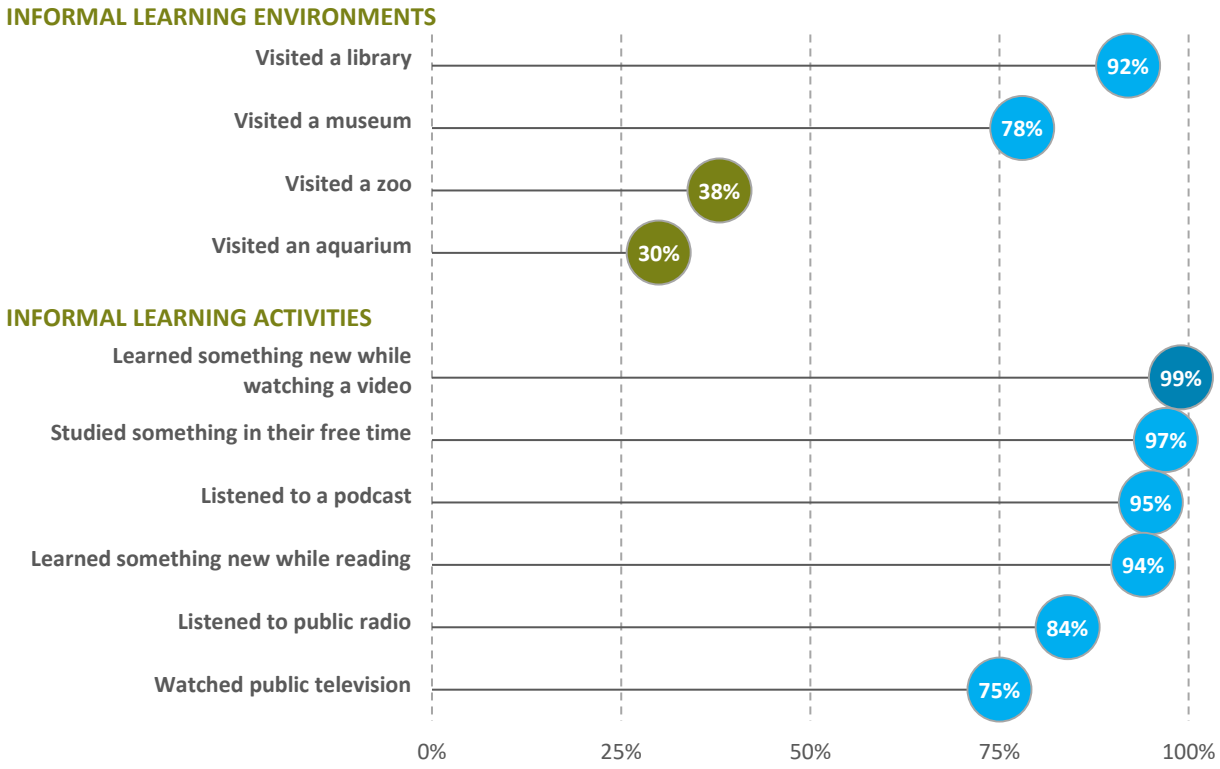
[16]https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf

[17]Hart, L. G., Larson, E. H., & Lishner, D. M. (2005). Rural definitions for health policy and research. *American Journal of Public Health, 95*(7), 1149-1155.

Although this research study did not attempt to change participants' interest in science, data were gathered to determine whether subjects visited informal learning environments or participated in informal learning activities in the past year (see Exhibit 14). All participants responded *yes* to at least one informal learning environment and at least one informal learning activity. Most participants were likely to have visited a library (92%) or to have learned something new while watching a video (99%), studied something in their free time (97%), listened to a podcast (95%), or learned something new while reading (94%). More than a third of participants visited a zoo in the past year (38%); just less than a third visited an aquarium (30%).

Exhibit 14: Informal Learning Participation Among Study Participants

*All study participants visited at least one informal learning environment and participated in at least one informal learning activity, although participants were **most likely** to have learned something new while watching a video and were **least likely** to have visited a zoo or aquarium.*



Note. n = 121.

Analytic Sample Post-Only Design: Research Questions 2–5

Seven medium-dose participants who completed a postassessment did not complete a preassessment and were excluded from the pre-post analyses but included in the post-only analyses. Therefore, there were 128 participants included in the post-only analyses: 41 from the low-dose group, 46 from the medium-dose group, and 41 from the high-dose group. There were no significant differences in demographics between the post-only analytic sample and the pre-post analytic sample (using Chi-squared tests of homogeneity).

Analysis

Exhibit 15 shows the analytic plan for the study. Survey data were analyzed descriptively in aggregate and also broken out by subgroup (e.g., race/ethnicity underrepresented in STEM, underrepresented gender in STEM, science person vs. non-science person). Scale scores for the Science Interest items were used to categorize survey participants as science people or non-science people. *Informal science participant* was originally intended as a potential subgroup; however, a correlation analysis of pretest responses revealed few patterns, and scale reliability was too low to accurately define this category (Cronbach's $\alpha = 0.485$). Hypotheses were tested using scale scores rather than individual item ratings, with the exception of four constructs measured using single items only: (a) awareness that there is a scientific field that studies human decision-making, (b) knowledge of human decision-making, (c) interest in learning more about decision science, and (d) interest in pursuing a Social, Behavioral, and Economics career. Parametric (e.g., *t*-tests, ANOVA) and non-parametric (e.g., Chi-squared tests) inference tests were used to analyze pre-post responses and to conduct subgroup comparisons for which the sample size was adequate. A significance level of $\alpha = 0.05$ was used to determine statistical significance.

Exhibit 15: Analytic Plan

Constructs	Analyses
Research Question 1: Does a person who engages in low doses of the treatment experience similar gains as someone who engages in higher doses of the treatment?	
Survey Scales ▶ Career Interest in Science ▶ Change in attitude about the relevance of science ▶ Importance of Scientific Research. **Content Assessment** ▶ Awareness that there is a scientific field that studies human decision-making ▶ Knowledge of autopilot thinking ▶ Knowledge of Sesame Credit ▶ Understanding of bias ▶ Understanding of using social influence to change behavior	▶ Pre/post survey gains ▶ Significant differences among study groups ▶ Analyses by three subgroups including gender, underrepresented in STEM, informal learner (environment and activity), and science person
Research Question 2: Does a person who engages in low doses of the treatment demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment?	
Knowledge of human decision-making	▶ Significant differences among low-, medium- , and high-dose study groups on post content assessment ▶ Analyses by three subgroups
Research Question 3: Does a person who engages in low doses of the treatment e demonstrate similar anticipated actions change as someone who engages in a higher dose of the treatment?	
Anticipated actions	▶ Significant differences among low-, medium-, and high-dose study groups on post content assessment ▶ Analyses by three subgroups
Research Question 4: Does a person who engages in low doses of the treatment demonstrate similar STEM interest as someone who engages in a higher dose of the treatment?	
▶ Interest in learning more about decision science ▶ Interest in pursuing Social, Behavioral, and Economics career ▶ Interest in informal learning environments ▶ Interest in informal learning activities ▶ Interest in learning more about the HYM topics	▶ Significant differences among low-, medium-, and high-dose study groups on post content assessment ▶ Analyses by three subgroups ▶ Correlation analyses by each informal learning environment item to determine if there is a correlation between a study group and interest in certain activities
Research Question 5: Are youth more engaged in the social media clips than the full episode?	
▶ Engagement in informal science learning activity	▶ Significant differences among low-, medium-, and high-dose study groups on post content assessment ▶ Analyses by three subgroups

Findings

This chapter summarizes the findings for each research question and the respective hypotheses, and highlights notable subgroup findings. As shown in Exhibit 16, the hypotheses were not supported, but the analyses revealed thought-provoking findings. All three study groups (low-dose, medium-dose, and high-dose) experienced content knowledge gains from pre-to-post, and the medium- and high-dose groups experienced significant gains. This is an unexpected positive finding because regardless of the length of time watching HYM, content knowledge increased. This finding is important to the field on informal science learning because these results suggest that shorter clips may be as effective as full episodes in increasing participants' content knowledge. Detailed data tables can be found in **Appendix D**.

HYM did not have an impact on participants' career interest in science, nor their view of the relevance and importance of science; there was no change pre-to-post. While their overarching views of science did not change, all three study groups reported on the postassessment a strong interest in learning more about the field of decision science and the specific HYM topics.

All participants were engaged in the activity (watching HYM videos and clips) regardless of the study group. Contrary to our hypotheses, these results suggest that a young audience may be just as engaged in the full episode as they are viewing the clips. This finding is important for OPB because it suggests that OPB could effectively engage a younger audience with either the shorter video clips or with the longer format.

After watching the videos, participants were asked if they plan to reflect on how to make decisions, discuss any of the topics with others, search for more information about one of the interviewed scientists, or search for more information about any of the topics. The low-dose participants were significantly less likely to indicate these actions as a result of participating. These findings suggest that although shorter content may deliver knowledge and be engaging, longer exposure (i.e., at least 20 minutes) may be needed to make people more likely to take action.

There were key differences in the findings by subgroups. For example, non-science people showed significantly greater gains in interest in a career in science, attitudes about the relevance of science, and attitudes about the importance of scientific research than science people. Although HYM did not have an impact on these variables for all participants, the findings suggest that videos such as these may be effective at broadening interest and access to STEM for individuals who do not identify as science people.

In addition to having an impact on non-science people, HYM had a positive impact on science people. Science people scored higher on the content knowledge items on the preassessment and also experienced greater gains in knowledge than non-science people. Science people were more likely to demonstrate anticipated actions, expressed greater interest in learning more about decision science and HYM topics, and reported higher levels of engagement than non-science people. These findings have important implications for future research in informal science learning; in addition to an aggregate level analyses, the results should be analyzed by this type of subgroup variable.

Since women and certain racial and ethnic groups are underrepresented in STEM careers, the findings were analyzed by these subgroups. The findings indicate that HYM had a similar impact on females and males. An important distinction is that after watching the videos, females showed more interest in pursuing a career in social, behavioral, and economic sciences than males. HYM had a similar impact for those underrepresented in STEM and those not underrepresented in STEM. One key difference was that

those UR in STEM scored lower than non-UR participants on the pretest, but they experienced larger gains pre-to-post. These findings suggest that projects like HYM could be an effective method for attracting a broader audience to STEM.

Exhibit 16: Summary of Research Question and Hypotheses.

Hypotheses	Hypotheses Supported?
Research Question 1: Does a person who engages in low doses of the treatment experience similar gains as someone who engages in higher doses of the treatment?	
Hypothesis 1: People in the high-dose treatment group will experience the greatest pre-to-post gains.	Not supported.
Hypothesis 2: People in the medium-dose treatment group will experience greater pre-to-post gains than the low-dose group.	Not supported.
Hypothesis 3: All three study groups (high-dose, medium-dose, and low-dose) will experience significant gains pre-to-post.	**Partially supported by evidence: All three study groups experienced significant content knowledge gains from pre-to-post, but no interest or attitude gains.**
Research Question 2: Does a person who engages in low doses of the treatment demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment?	
Hypothesis 4: The post scores for knowledge of human decision-making will be similar across all three study groups with the high dose group obtaining a slightly higher score.	Not supported.
Research Question 3: Does a person who engages in low doses of the treatment demonstrate similar anticipated actions change as someone who engages in a higher dose of the treatment?	
Hypothesis 5: The post scores for anticipated actions will be similar across all three study groups with the high-dose group obtaining a slightly higher score (i.e., more participants indicating that they will change their behavior).	**Not supported. However, the low-dose group is significantly less likely to demonstrate anticipated actions than higher dosage groups ($p < 0.001$).**
Research Question 4: Does a person who engages in low doses of the treatment demonstrate similar STEM Interest as someone who engages in a higher dose of the treatment?	
Hypothesis 6: The post scores for STEM interest will be similar across all three study groups with the high-dose group obtaining a slightly higher score.	Not supported.
Research Question 5: Are youth more engaged in the social media clips than the full episode?	
Hypothesis 7: The low-dose and medium-dose treatment groups will report higher levels of engagement on the Engagement in Science Learning scale than those in the high-dose group.	Not supported.

The remainder of this chapter provides details regarding the analyses conducted for each research question, including aggregate findings and findings by subgroup.

Research Question 1: Pre-Post Change

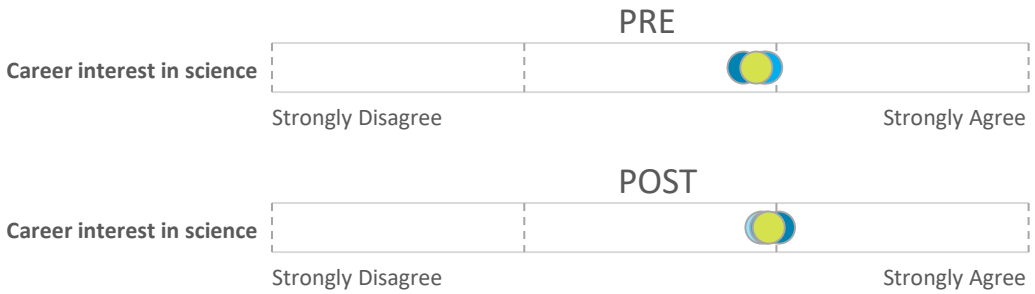
Research Question 1 asked, **Does a person who engages in low doses of the treatment experience similar gains as someone who engages in higher doses of the treatment?** The independent variable is HYM. The dependent interest/attitude variables are: (a) interest in a science career, (b) attitude about the relevance of science, and (c) attitude toward the importance of science. The dependent content knowledge variables are: (a) awareness that there is scientific field that studies human decision-making, (b) knowledge of autopilot thinking, (c) knowledge of Sesame Credit (only for medium- and high-dose groups), (d) understanding of bias, and (e) understanding of using social influence to change behavior. For each of the dependent variables listed above, paired *t*-tests were used to assess pre-post change in aggregate, while two-way repeated measures ANOVA tests were used to assess group differences (time is the within-subjects factor, and dosage is the between-subjects factor). A significance level of $\alpha = 0.05$ was used to determine statistical significance.

Interest and Attitudes

As shown in Exhibits 17 and 18, participants were interested in a career in science, agreed that science is relevant, and felt scientific research is important.

Exhibit 17: Pre-Post Career Interest in Science

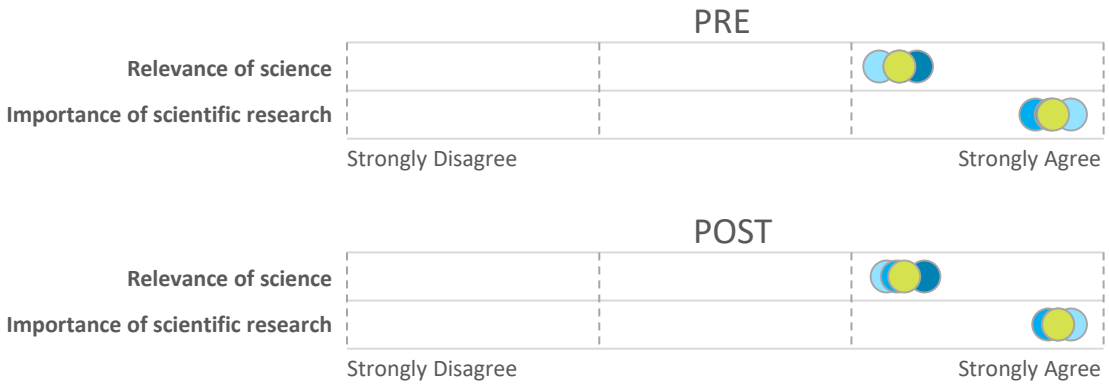
Participants showed interest in a career in science. However, there was little to no change in interest from pre-to-post.



Note. **All:** *n* = 121. **Low dose:** *n* = 41. **Medium dose:** *n* = 39. **High dose:** *n* = 41.

Exhibit 18: Pre-Post Attitudes About the Relevance of Science

Participants agreed that science is relevant and scientific research is important. There was little to no change among participants regarding attitudes about the relevance of science or the importance of scientific research from pre-to-post.



Note. **All:** *n* = 121. **Low dose:** *n* = 41. **Medium dose:** *n* = 39. **High dose:** *n* = 41.

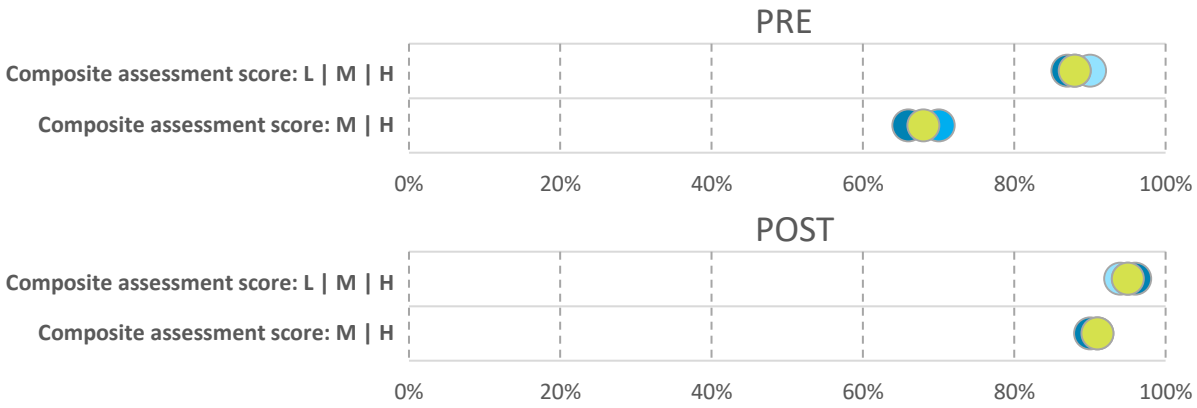
Content Knowledge

RMC Research planned to conduct an analysis on participants' total content knowledge and analyze the results by four subscores: knowledge of autopilot thinking, knowledge of Sesame Credit, understanding of bias, and understanding of social influence. When RMC Research ran interclass correlations (ICCs) for the total content knowledge score and for the subscores, all reliabilities were low except for the subscore for understanding of social influence (see **Appendix C**). The low reliability for the content measures is understandable due to the content items assessing several different constructs, variance among participants' knowledge within each content grouping, and variance among participants' knowledge across categories. Due to these factors, rather than creating a scale, RMC Research created a composite assessment score, which is the percentage of the assessment items answered correctly.

In aggregate (see Exhibit 19), there is strong evidence of significant increases in the composite scores for the medium- and high-dose participants. There were knowledge gains for the low-dose participants, but the gains were not significant. There were no differences in knowledge gains among low-, medium-, and high-dose groups. These results suggest that shorter clips may be as effective as full episodes in increasing participants' content knowledge.

Exhibit 19: Pre-Post Knowledge Gains

Although there were gains in content knowledge for participants, the gains were only statistically significant for those who took the longer assessment (medium- and high-dose participants). There were not significant differences by dosage group.



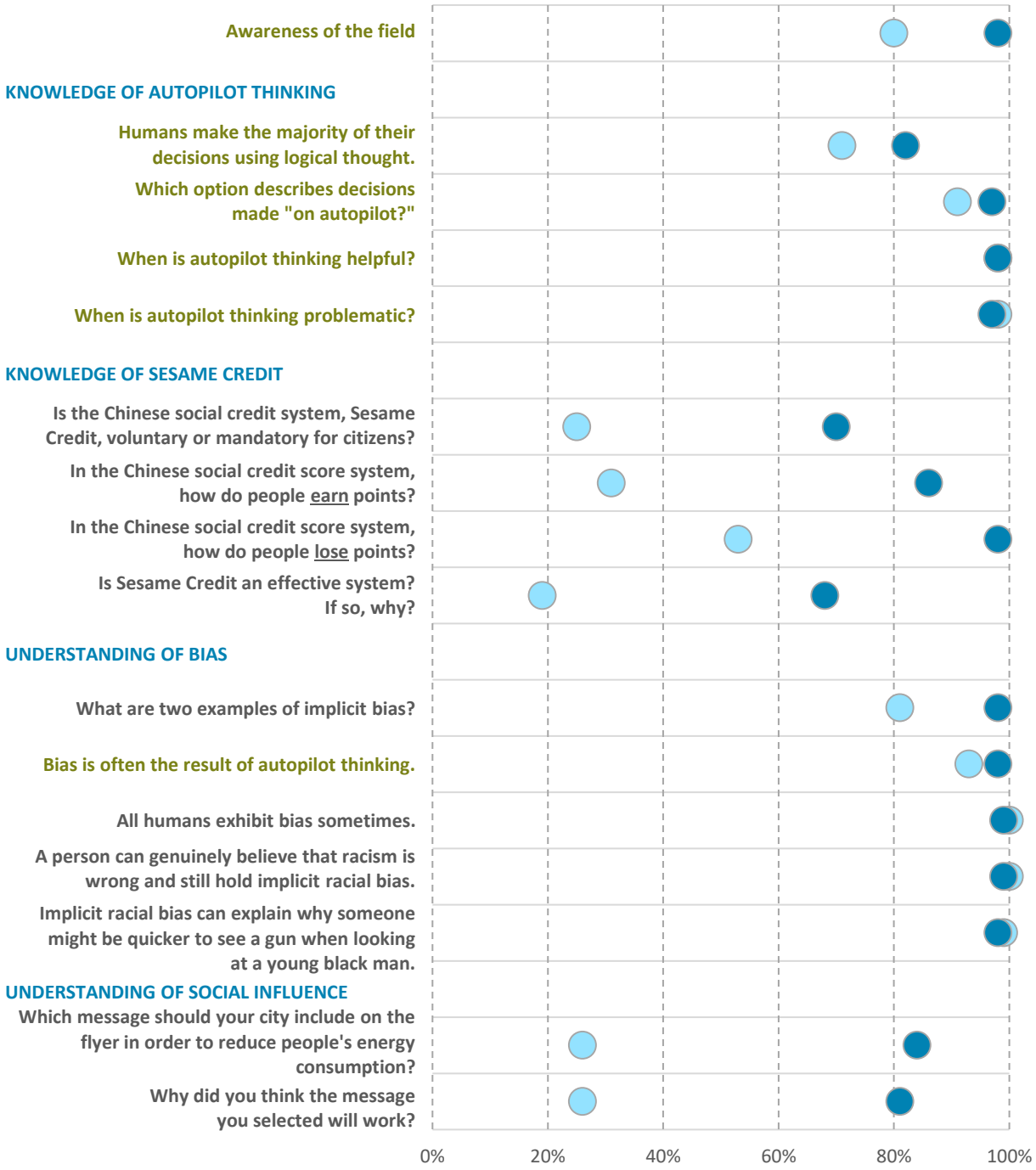
Note. **All:** *n* = 121. **Low dose:** *n* = 41. **Medium dose:** *n* = 39. **High dose:** *n* = 41.

Note. Percentage of correct assessment items is shown. M | H were administered only to the medium- and high-dose groups. There were common items among the low-, medium-, and high-dose assessment (see highlighted questions in Exhibit 20). The medium- and high-dose groups had additional questions pertaining to the additional videos they watched.

Exhibit 20 shows the aggregate scores for each content knowledge item. Participants experienced the greatest gains from pre-to-post in knowledge of Sesame Credit items and understanding of social influence to change behavior. Individual knowledge of Sesame Credit items ranged from 19% to 53% correct at pre, to 68% to 98% correct at post. Understanding of social influence to change behavior items each had 26% correct responses at pre, and more than 80% correct responses at post. There were many items that were high on the preassessment, including awareness of the field (*M* = 80% correct), which increased to 98% correct responses on the postassessment. Preassessment knowledge was also high for knowledge of autopilot thinking and understanding of bias. Three of the four knowledge of autopilot thinking items had more than 90% correct responses. Only 71% of respondents correctly answered, "Humans make the majority of their decisions using logical thought," which saw gains to 82% correct at post. Four of the five items about understanding bias (including the item common across all study groups, “Bias is often the result of autopilot thinking”) received at least 93% correct responses at pre, leaving very little room for improvement from pre-to-post. The exception was "What are two examples of implicit bias?," which shifted from 81% correct responses at pre to 98% correct responses at post.

Exhibit 20: Pre-Post Assessment Scores

The largest pre-to-post gains occurred in knowledge of Sesame Credit and understanding of social influence, which had much lower preassessment scores than the other constructs.



Note. **Pre.** **Post.** Percentage of construct items correct is shown.
Items in **gray** are common to Medium and High-Dose groups (**M | H assessment**): *n* = 80.
Items in **green** are common to all dosage groups (**L | M | H assessment**): *n* = 121.

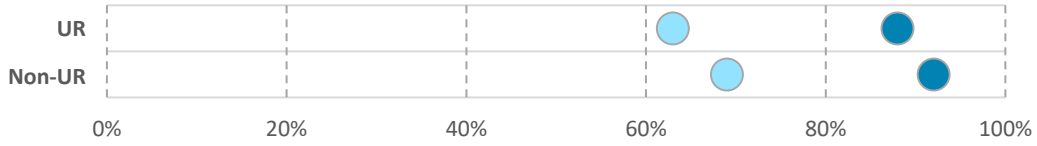
Subgroup Findings

Each subgroup analysis (gender, race/ethnicity, and science person versus non-science person) was conducted using two-way repeated measures ANOVA tests to assess group differences (time is the within-subjects factor, and subgroup is the between-subjects factor). A significance level of $\alpha = 0.05$ was used to determine statistical significance. In this section of the report, only significant subgroup differences are reported.

Participants who selected American Indian or Alaska Native, Black or African American, Native Hawaiian or other Pacific Islander and/or Hispanic were coded as *underrepresented in STEM* (UR). Participants who selected White and/or Asian were coded as *not underrepresented in STEM* (non-UR). Participants who responded only *multiracial* or *mixed* ($n = 2$) were omitted from the analyses, since they may or may not be in underrepresented racial or ethnic groups. Exhibit 21 shows a significant difference for those who are in a racial or ethnic group that is underrepresented in STEM.

Exhibit 21: Assessment Scores for Medium and High-Dose Groups by Underrepresented Race or Ethnicity

Underrepresented participants scored lower than non-underrepresented participants on the pretest and also experienced larger gains from pre-to-post (UR Δ = 25 pp, Non-UR Δ = 22 pp; p = 0.039).

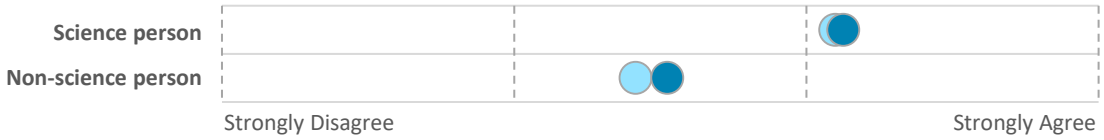


Note. **Pretest.** **Posttest.** UR: $n = 24$, Non-UR: $n = 54$. Percentage of construct items correct is shown.

Participants whose mean scale score for the Science Interest items were more in agreement than disagreement were coded as *science people*. Exhibits 22–25 show significant differences for those who identify as a *science* person.

Exhibit 22: Interest in Career in Science by Science Person Versus Non-Science Person

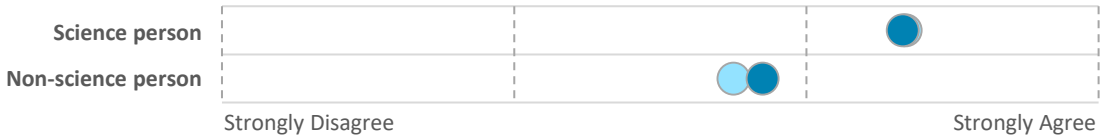
Non-science people reported less interest in a career in science than science people on the pretest and experienced larger interest gains from pre-to-post (Non-science people Δ = 0.109, Science people Δ = 0.028; p < 0.001).



Note. **Pretest.** **Posttest.** Science person: $n = 90$, Non-science person: $n = 31$.

Exhibit 23: Attitude About the Relevance of Science by Science Person Versus Non-Science Person

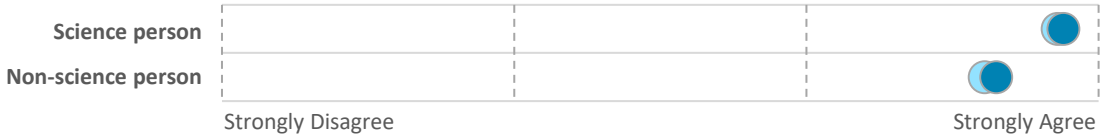
Non-science people rated the relevance of science lower than science people on the pretest and exhibited a larger positive change from pre-to-post (Non-science people Δ = 0.105, Science people Δ = 0.010; p < 0.001).



Note. **Pretest.** **Posttest.** Science person: *n* = 90, Non-science person: *n* = 31.

Exhibit 24: Attitude About the Importance of Scientific Research by Science Person Versus Non-Science Person

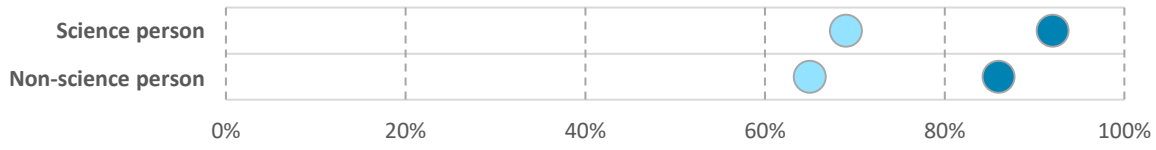
Non-science people rated the importance of scientific research lower than science people on the pretest and exhibited a larger positive change from pre-to-post (Non-science people Δ = 0.032, Science people Δ = 0.022; p = 0.002).



Note. **Pretest.** **Posttest.** Science person: *n* = 90, Non-science person: *n* = 31.

Exhibit 25: Assessment Scores for Medium and High-Dose Groups by Science Person Versus Non-Science Person

Science people scored higher than non-science people on the pretest and also experienced larger gains from pre-to-post (Science people Δ = 24 pp, Non-science people Δ = 21 pp; p = 0.038).



Note. **Pretest.** **Posttest.** Science person: *n* = 61, Non-science person: *n* = 19.

Research Question 2: Content Knowledge, Post Only

Research Question 2 asked, **Does a person who engages in low doses of the treatment experience demonstrate similar post content knowledge as someone who engages in a higher dose of the treatment?** In this post-only design all three groups answered this open-ended question on the postassessment only: "What does it mean to hack a human's mind and why does it matter?" The independent variable is HYM and the dependent content knowledge variable is knowledge of human decision-making. All participants answered this question correctly; therefore, there were no differences among groups or subgroups.

Research Question 3: Anticipated Behavior Change, Post Only

Research Question 3 asked, **Does a person who engages in low doses of the treatment demonstrate similar anticipated actions as someone who engages in a higher dose of the treatment?** In this post-only design all three groups answered these questions on the postassessment only: "After watching these videos do you plan to reflect on how you make decisions, discuss any of the topics with others, search for more information about one of the interviewed scientists, orsearch for more information about any of the topics?" The independent variable is HYM, and the dependent variable is anticipated actions. One-way ANOVA was used to assess differences in scale score among dosage groups. A significance level of $\alpha = 0.05$ was used to determine statistical significance.

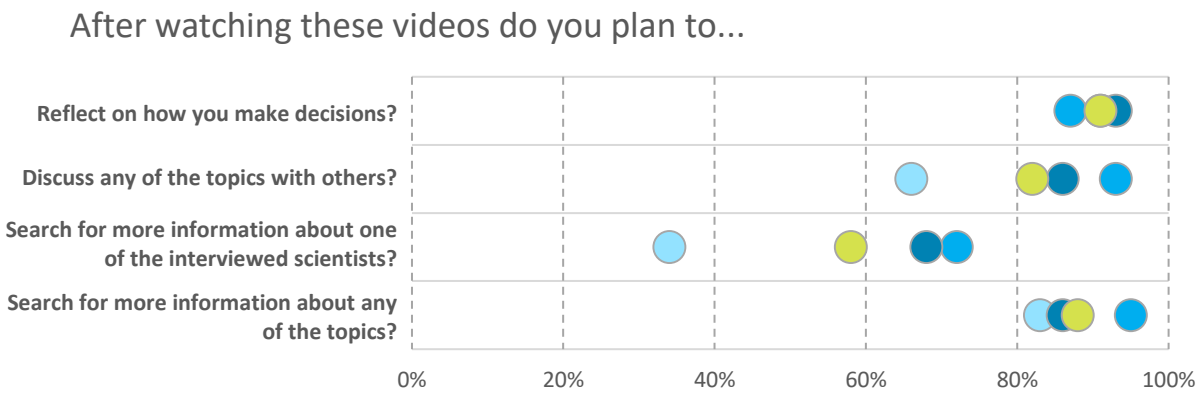
As shown in Exhibit 26, low-dose participants were significantly less likely to demonstrate anticipated actions than medium or high-dose participants. Low-dose participants were particularly less likely to discuss the topics with others or to search for information about one of the scientists. These findings suggest that although the knowledge gains may be similar among dosage groups, longer exposure to the information may increase likelihood of future actions.

Exhibit 26: Pre-Post Career Interest in Science

Low-dose participants were significantly less likely to demonstrate anticipated actions than medium- or high-dose participants.

Note. **All:** *n* = 128. **Low-dose:** *n* = 41. **Medium-dose:** *n* = 46. **High-dose:** *n* = 41.
Percentages show the percentage of participants who *agreed* or *strongly agreed* with each item.

Low-dose participants were less likely to discuss the topics with others or search for information about one of the scientists.



Note. **All:** *n* = 128. **Low dose:** *n* = 41. **Medium dose:** *n* = 46. **High dose:** *n* = 41. Percentages show the percentage of participants who *agreed* or *strongly agreed* with each item.

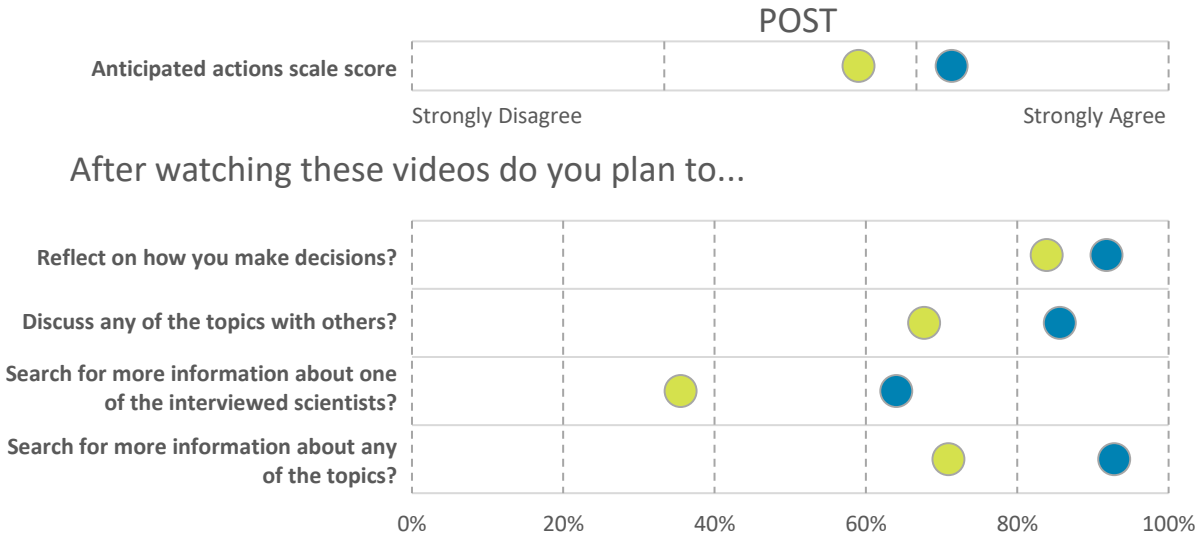
Subgroup Findings

Each subgroup analysis (gender, race/ethnicity, and science person versus non-science person) was conducted using independent *t*-tests to assess group differences. A significance level of $\alpha = 0.05$ was used to determine statistical significance. In this section of the report, only significant subgroup differences are reported. There were no significant differences by gender or by underrepresented race or ethnicity in STEM.

Exhibit 27 shows significant difference for those who identify as a science person. Participants whose mean scale score for the Science Interest items more in agreement than disagreement were coded as *science people*.

Exhibit 27: Anticipated Actions by Science Person Versus Non-Science Person

Science people are more likely to take action after viewing the videos than non-science people (Science people M = 3.14, Non-science people M = 2.77; p = 0.004).



Note. **Science person:** *n* = 97, **Non-science person:** *n* = 31. Percentages show the percentage of participants who *agreed* or *strongly agreed* with each item.

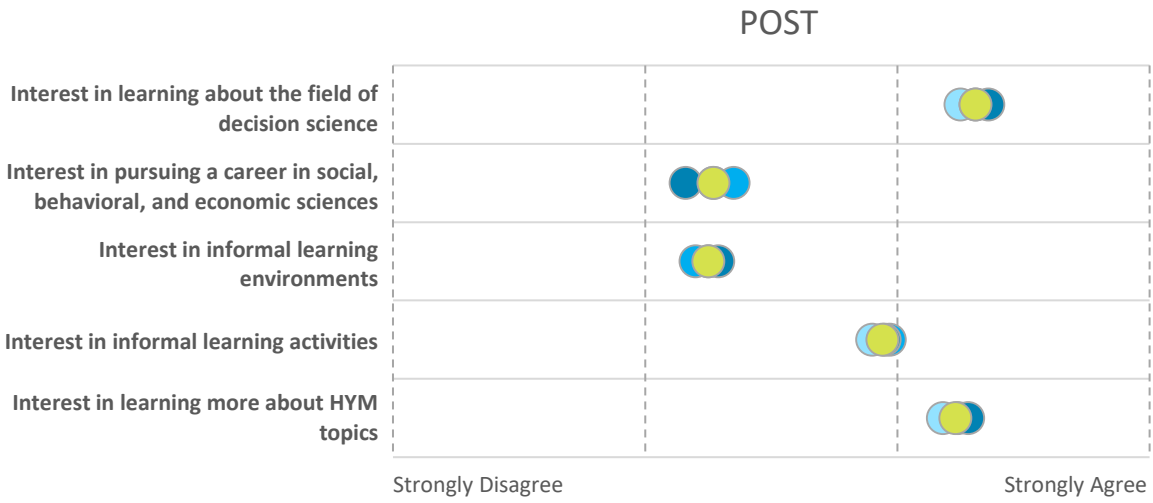
Research Question 4: STEM Interest, Post Only

Research Question 4 asked, **Does a person who engages in low doses of the treatment demonstrate similar STEM interest as someone who engages in a higher dose of the treatment?** To address this, participants answered questions pertaining to their interest in STEM. The independent variable is HYM, and the dependent variables are: (a) interest in learning more about decision science, (b) interest in pursuing a career in social, behavioral, and economic sciences, (c) interest in informal learning environments, (d) interest in informal learning activities, and (e) interest in learning more about the HYM topics. One-way ANOVA was used to assess differences among dosage groups. Interest in learning more about decision science and interest in pursuing a career in social, behavioral, and economic sciences were assessed using a single item, whereas the other constructs were assessed using a group of items and were analyzed using a scale score for each construct. A significance level of $\alpha = 0.05$ was used to determine statistical significance.

Exhibit 28 shows that the interest ratings varied from disagreement to moderately strong agreement, with lower interest in pursuing a social, behavioral, and economic sciences career and lower interest in informal learning environments. There was more interest in learning about the field of decision science and learning more about HYM topics. Participants showed some interest in informal learning activities. There were no significant differences among dosage groups. These results suggest that shorter clips may be as effective as full episodes in generating interest about the field of decision science and learning more about HYM topics.

Exhibit 28: STEM Interest

Participants showed the most interest in learning about the field of decision science and learning more about HYM topics. Participants showed less interest in pursuing a career in the social, behavioral, and economic sciences.



Note. **All:** *n* = 128. **Low-dose:** *n* = 41. **Medium-dose:** *n* = 46. **High-dose:** *n* = 41.

Subgroup Findings

Each subgroup analysis (gender, race/ethnicity, and science person versus non-science person) was conducted using independent *t*-tests to assess group differences. A significance level of $\alpha = 0.05$ was used to determine statistical significance. In this section of the report, only significant subgroup differences are reported. There were no significant differences by underrepresented race or ethnicity in STEM.

Exhibit 29 shows a significant difference by gender. Gender comparisons include only male (cisgender and transgender) and female (cisgender and transgender) participants since there were few non-binary or gender queer respondents ($n = 5$).

Exhibit 29: Interest in Pursuing a Social, Behavioral, and Economics Career by Gender

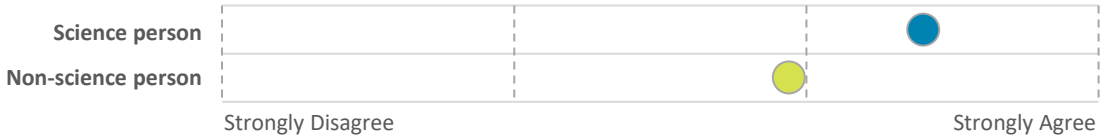
Females show more interest in pursuing a social, behavioral, and economics career than males (Female M = 2.43, Male M = 2.00; p = 0.002).

Note. **Female:** $n = 67$, **Male:** $n = 55$.

Participants whose mean scale score for the Science Interest items more in agreement than disagreement were coded as *science people*. Exhibits 30–31 show significant differences for those that identify as a science person.

Exhibit 30: Interest in Learning More About Decision Science by Science Person Versus Non-Science Person

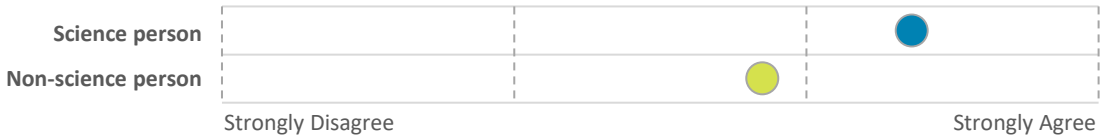
Science people express more interest in learning about decision science than non-science people (Science people M = 3.40, Non-science people M = 2.94; p < 0.001).



Note. **Science person:** $n = 97$, **Non-science person:** $n = 31$.

Exhibit 31: Interest in Learning More About HYM Topics by Science Person Versus Non-Science Person

Science people express more interest in learning about HYM topics than non-science people (Science people M = 3.36, Non-science people M = 2.85; p < 0.001).



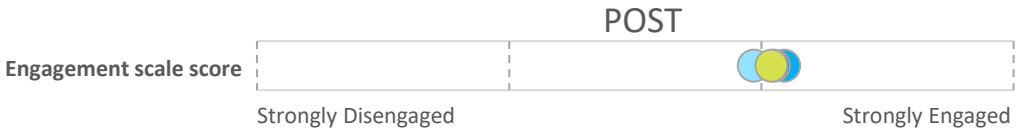
Note. **Science person:** *n* = 97, **Non-science person:** *n* = 31.

Research Question 5: Engagement, Post Only

Research Question 5 asked, **Are youth more engaged in the social media clips than the full episode?** To address this question, participants answered questions pertaining to their engagement during the informal learning activity (i.e., watching the videos). The independent variable is HYM, and the dependent variable is engagement in the informal learning activity. One-way ANOVA was used to assess differences in scale score among dosage groups. A significance level of α = 0.05 was used to determine statistical significance. Although overall participants were engaged in the activity (watching HYM videos and clips), there were no significant difference among dosage groups (see Exhibit 32). These results suggest that a young audience may be just as engaged in the full episode as they are viewing the clips.

Exhibit 32: Engagement in the Informal Learning Activity

Participants reported being engaged while watching the HYM content.



Note. **All:** *n* = 128. **Low-dose:** *n* = 41. **Medium-dose:** *n* = 46. **High-dose:** *n* = 41.

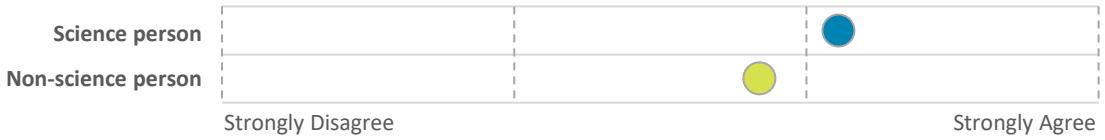
Subgroup Findings

Each subgroup analysis (gender, race/ethnicity, and science person versus non-science person) was conducted using independent *t*-tests to assess group differences. A significance level of α = 0.05 was used to determine statistical significance. In this section of the report, only significant subgroup differences are reported. There were no significant differences by underrepresented race or ethnicity in STEM.

Exhibit 33 shows a significant difference for those identified as a science person. Participants whose mean scale score for the Science Interest items more in agreement than disagreement were coded as *science people*.

Exhibit 33: Engagement in Informal Learning Activity by Science Person Versus Non-Science Person

Science people reported higher engagement with the videos than non-science people (Science people M = 3.11, Non-science people M = 2.84; p = 0.003).



Note. **Science person:** *n* = 97, **Non-science person:** *n* = 31.

Limitations

Although post hoc corrections were applied for subgroup comparisons, the large number of inferential tests in this study increases the possibility of Type I errors (i.e., false positives). This is a common limitation of informal learning and K–12 education studies. The only way to address this is to limit the number of constructs or greatly increase the sample size. Additionally, COVID-19 impacted recruitment and participation, raising the probability that the study was underpowered to detect significant differences. Therefore, results should be interpreted cautiously.

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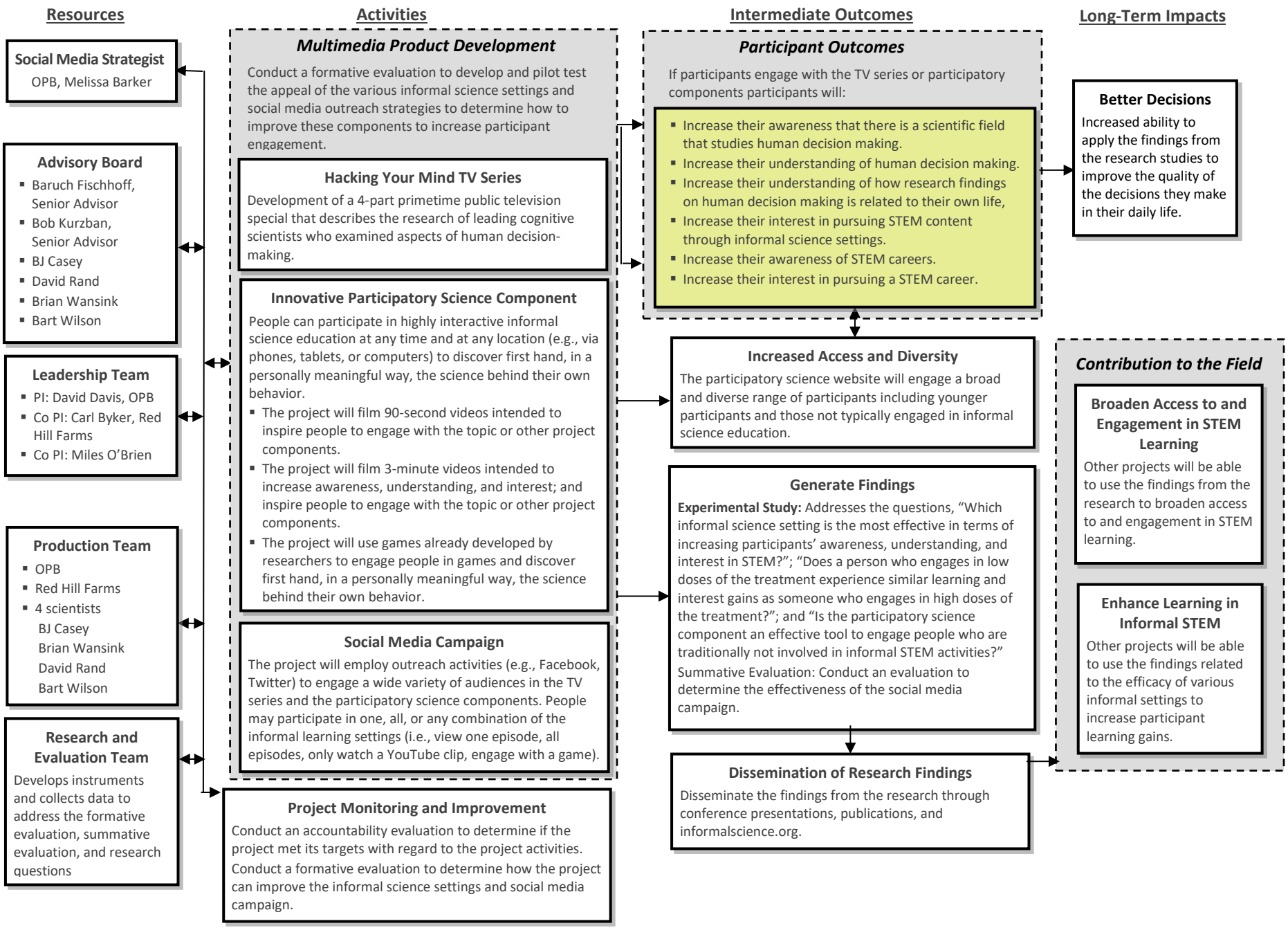
Appendix A: Logic Model


Resources
Activities
Intermediate Outcomes
Long-Term Impacts
Social Media Strategist
OPB, Melissa Barker
Advisory Board
Baruch Fischhoff, Senior Advisor
Bob Kurzban, Senior Advisor
BJ Casey
David Rand
Brian Wansink
Bart Wilson
Leadership Team
PI: David Davis, OPB
Co PI: Carl Byker, Red Hill Farms
Co PI: Miles O'Brien
Production Team
OPB
Red Hill Farms
4 scientists
BJ Casey
Brian Wansink
David Rand
Bart Wilson
Research and Evaluation Team
Develops instruments and collects data to address the formative evaluation, summative evaluation, and research questions
Multimedia Product Development
Conduct a formative evaluation to develop and pilot test the appeal of the various informal science settings and social media outreach strategies to determine how to improve these components to increase participant engagement.
Hacking Your Mind TV Series
Development of a 4-part primetime public television special that describes the research of leading cognitive scientists who examined aspects of human decision-making.
Innovative Participatory Science Component
People can participate in highly interactive informal science education at any time and at any location (e.g., via phones, tablets, or computers) to discover first hand, in a personally meaningful way, the science behind their own behavior.
The project will film 90-second videos intended to inspire people to engage with the topic or other project components.
The project will film 3-minute videos intended to increase awareness, understanding, and interest; and inspire people to engage with the topic or other project components.
The project will use games already developed by researchers to engage people in games and discover first hand, in a personally meaningful way, the science behind their own behavior.
Social Media Campaign
The project will employ outreach activities (e.g., Facebook, Twitter) to engage a wide variety of audiences in the TV series and the participatory science components. People may participate in one, all, or any combination of the informal learning settings (i.e., view one episode, all episodes, only watch a YouTube clip, engage with a game).
Project Monitoring and Improvement
Conduct an accountability evaluation to determine if the project met its targets with regard to the project activities.
Conduct a formative evaluation to determine how the project can improve the informal science settings and social media campaign.
Participant Outcomes
If participants engage with the TV series or participatory components participants will:
Increase their awareness that there is a scientific field that studies human decision making.
Increase their understanding of human decision making.
Increase their understanding of how research findings on human decision making is related to their own life,
Increase their interest in pursuing STEM content through informal science settings.
Increase their awareness of STEM careers.
Increase their interest in pursuing a STEM career.
Increased Access and Diversity
The participatory science website will engage a broad and diverse range of participants including younger participants and those not typically engaged in informal science education.
Generate Findings
Experimental Study: Addresses the questions, "Which informal science setting is the most effective in terms of increasing participants' awareness, understanding, and interest in STEM?"; "Does a person who engages in low doses of the treatment experience similar learning and interest gains as someone who engages in high doses of the treatment?"; and "Is the participatory science component an effective tool to engage people who are traditionally not involved in informal STEM activities?"
Summative Evaluation: Conduct an evaluation to determine the effectiveness of the social media campaign.
Dissemination of Research Findings
Disseminate the findings from the research through conference presentations, publications, and informalscience.org.
Better Decisions
Increased ability to apply the findings from the research studies to improve the quality of the decisions they make in their daily life.
Contribution to the Field
Broaden Access to and Engagement in STEM Learning
Other projects will be able to use the findings from the research to broaden access to and engagement in STEM learning.
Enhance Learning in Informal STEM
Other projects will be able to use the findings related to the efficacy of various informal settings to increase participant learning gains.

Appendix B: Content Assessment Items

Informal Learning Study Pre Survey (L)

Section 1

The questions in this section are about things you may have done in the past year.

* 1. Name (First and Last)

* 2. Email Address

* 3. In the past year did you visit...

	Yes	No
A library		
A museum		
A zoo		
An Aquarium		

* 4. In the past year did you...

	Yes	No
Listen to public radio		
Listen to a podcast		
Watch public television		
Study something in your free time		
Learn something new while reading		
Learn something new while watching a video		

RMC RESEARCH

Informal Learning Study Pre Survey (L)

Section 2

The questions in this section ask for your thoughts about science.

* 5. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Much of what I learned in science classes is useful in my everyday life today.	○	○	○	○
Learning science can help me when I pick food to buy.	○	○	○	○
Caring about people is part of making a science choice, such as whether to use pesticides on plants.	○	○	○	○
Science helps me make sensible decisions.	○	○	○	○

* 6. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The things I did in science classes have nothing to do with the real world.	○	○	○	○
Science helps me make decisions that could affect my body.	○	○	○	○
Learning science will have an effect on the way I vote in elections.	○	○	○	○
Making decisions can be difficult without reliable evidence.	○	○	○	○

* 7. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Scientific research is important.	○	○	○	○
Scientific research should be funded.	○	○	○	○

* 8. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would dislike being a scientist.	○	○	○	○
I would dislike a job in a science laboratory.	○	○	○	○
A career in science would be dull and boring.	○	○	○	○
A job as a scientist would be boring.	○	○	○	○

* 9. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would like to work with people who make discoveries in science.	○	○	○	○
I would like to teach science.	○	○	○	○
Working in a science laboratory would be an interesting way to earn a living.	○	○	○	○
A job as a scientist would be interesting.	○	○	○	○

* 10. Is there a scientific field that studies how people make decisions?

- ○ Yes
- ○ No
- ○ I don't know

Informal Learning Study Pre Survey (L)

Section 3

The questions in this section are about autopilot thinking.

* 11. Humans make the majority of their decisions using logical thought.

- ◯ True
- ◯ False

* 12. Which option describes decisions made “on autopilot”?

- ◯ Slow thinking, deliberate
- ◯ Logical, rational
- ◯ Fast thinking, snap judgements

* 13. When is autopilot thinking helpful?

* 14. When is autopilot thinking problematic?

Informal Learning Study Pre Survey (L)

Section 4

The question in this section is about implicit bias.

* 15. Please select the correct answer.

	True	False
Bias is often the result of autopilot thinking.	○	○

Informal Learning Study Pre Survey (L)

Clip - Overarching HYM

Please watch the video clip below. When finished, access the post survey using the chat feature in Zoom.

Informal Learning Study Post Survey (L)

Section 1

The questions in this section ask about your thoughts on the video.

* 1. Name (First and Last)

* 2. Email Address

* 3. During the video...

	Strongly Disagree	Disagree	Agree	Strongly Agree
I felt bored.				
I felt happy.				
I felt excited.				
I was daydreaming a lot.				
I was focused on the things we were learning most of the time.				
Time went by quickly.				
I was busy doing other things.				
I talked to others about stuff not related to what we were learning.				

* 4. Did anything in the video surprise you? Please describe.

Informal Learning Study Post Survey (L)

Section 2

The questions in this section ask how you feel after viewing the video.

* 5. This experience has made me want to visit....

	Strongly Disagree	Disagree	Agree	Strongly Agree
A library	○	○	○	○
A museum	○	○	○	○
A zoo	○	○	○	○
An Aquarium	○	○	○	○

Other (please describe)

* 6. This experience has made me want to...

	Strongly Disagree	Disagree	Agree	Strongly Agree
Watch more of these types of shows.	○	○	○	○
Listen to public radio.	○	○	○	○
Listen to a podcast.	○	○	○	○
Watch public television.	○	○	○	○
Study something in my free time.	○	○	○	○
Learn something while reading.	○	○	○	○
Learn something new while watching a video.	○	○	○	○

* 7. This experience has made me want to learn more about...

	Strongly Disagree	Disagree	Agree	Strongly Agree
The video topics.				
Behavioral science.				
Science.				
How humans make decisions.				
The field of decision science.				

* 8. This experience has made me want to....

	Strongly Disagree	Disagree	Agree	Strongly Agree
Pursue a career in social, behavioral, or economic sciences.				

* 9. After watching these videos do you plan to...

	Strongly Disagree	Disagree	Agree	Strongly Disagree
Reflect on how you make decisions?				
Discuss any of the topics with others?				
Search for more information about one of the interviewed scientists?				
Search for more information about any of the topics?				

Informal Learning Study Post Survey (L)

Section 3

The questions in this section ask for your thoughts about science.

* 10. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I want to learn more about science.	○	○	○	○
I like to engage in science-related hobbies in my free time.	○	○	○	○
I want to understand how processes in science work.	○	○	○	○
I often visit science-related websites.	○	○	○	○
I enjoy learning about new scientific discoveries or inventions.	○	○	○	○
Other people would describe me as a 'science person.'	○	○	○	○

* 11. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I am very interested in the sciences.	○	○	○	○
I enjoy reading about science-related topics.	○	○	○	○
I like to observe things in nature.	○	○	○	○
I enjoy talking about science topics with others.	○	○	○	○
I enjoy looking at information presented in scientific tables and graphs.	○	○	○	○

* 12. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Much of what I learned in science classes is useful in my everyday life today.	○	○	○	○
Learning science can help me when I pick food to buy.	○	○	○	○
Caring about people is part of making a science choice, such as whether to use pesticides on plants.	○	○	○	○
Science helps me make sensible decisions.	○	○	○	○

* 13. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The things I did in science classes have nothing to do with the real world.	○	○	○	○
Science helps me make decisions that could affect my body.	○	○	○	○
Learning science will have an effect on the way I vote in elections.	○	○	○	○
Making decisions can be difficult without reliable evidence.	○	○	○	○

* 14. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Scientific research is important.	○	○	○	○
Scientific research should be funded.	○	○	○	○

* 15. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would dislike being a scientist.	○	○	○	○
I would dislike a job in a science laboratory.	○	○	○	○
A career in science would be dull and boring.	○	○	○	○
A job as a scientist would be boring.	○	○	○	○

* 16. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would like to work with people who make discoveries in science.	○	○	○	○
I would like to teach science.	○	○	○	○
Working in a science laboratory would be an interesting way to earn a living.	○	○	○	○
A job as a scientist would be interesting.	○	○	○	○

* 17. Is there a scientific field that studies how people make decisions?

- ○ Yes
- ○ No
- ○ I don't know

Informal Learning Study Post Survey (L)

Section 4

The questions in this section are about autopilot thinking.

* 18. Humans make the majority of their decisions using logical thought.

- ◯ True
- ◯ False

* 19. Which option describes decisions made 'on autopilot'?

- ◯ Slow thinking, deliberate
- ◯ Logical, rational
- ◯ Fast thinking, snap judgements

* 20. When is autopilot thinking helpful?

* 21. When is autopilot thinking problematic?

* 22. Please select the correct answer.

	True	False
Bias is often the result of autopilot thinking.	◯	◯

Informal Learning Study Post Survey (L)

Section 8

The question in this section is about the overall theme of the video.

* 23. What does it mean to hack a human's mind, and why does it matter?

Informal Learning Study Post Survey (L)

Section 9

This section includes demographic questions.

24. What is your age?

25. What is your race/ethnicity? (Mark all that apply)

- [ ] American Indian or Alaska Native
- [ ] Asian
- [ ] Black or African American
- [ ] Native Hawaiian or other Pacific Islander
- [ ] White
- [ ] Hispanic
- [ ] Something else. Please describe.

26. What gender to you identify as?

27. What is the zip code where you live?

Informal Learning Study Pre Survey (M)

Section 1

The questions in this section are about things you may have done in the past year.

* 1. Name (First and Last)

* 2. Email Address

* 3. In the past year did you visit...

	Yes	No
A library	○	○
A museum	○	○
A zoo	○	○
An Aquarium	○	○

* 4. In the past year did you...

	Yes	No
Listen to public radio	○	○
Listen to a podcast	○	○
Watch public television	○	○
Study something in your free time	○	○
Learn something new while reading	○	○
Learn something new while watching a video	○	○

Informal Learning Study Pre Survey (M)

Section 2

The questions in this section ask for your thoughts about science.

* 5. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Much of what I learned in science classes is useful in my everyday life today.	○	○	○	○
Learning science can help me when I pick food to buy.	○	○	○	○
Caring about people is part of making a science choice, such as whether to use pesticides on plants.	○	○	○	○
Science helps me make sensible decisions.	○	○	○	○

* 6. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The things I did in science classes have nothing to do with the real world.	○	○	○	○
Science helps me make decisions that could affect my body.	○	○	○	○
Learning science will have an effect on the way I vote in elections.	○	○	○	○
Making decisions can be difficult without reliable evidence.	○	○	○	○

* 7. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Scientific research is important.	○	○	○	○
Scientific research should be funded.	○	○	○	○

* 8. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would dislike being a scientist.	○	○	○	○
I would dislike a job in a science laboratory.	○	○	○	○
A career in science would be dull and boring.	○	○	○	○
A job as a scientist would be boring.	○	○	○	○

* 9. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would like to work with people who make discoveries in science.	○	○	○	○
I would like to teach science.	○	○	○	○
Working in a science laboratory would be an interesting way to earn a living.	○	○	○	○
A job as a scientist would be interesting.	○	○	○	○

* 10. Is there a scientific field that studies how people make decisions?

- ○ Yes
- ○ No
- ○ I don't know

Informal Learning Study Pre Survey (M)

Section 3

The questions in this section are about autopilot thinking.

* 11. Humans make the majority of their decisions using logical thought.

- ◯ True
- ◯ False

* 12. Which option describes decisions made “on autopilot”?

- ◯ Slow thinking, deliberate
- ◯ Logical, rational
- ◯ Fast thinking, snap judgements

* 13. When is autopilot thinking helpful?

* 14. When is autopilot thinking problematic?

Informal Learning Study Pre Survey (M)

Section 4

The questions in this section are about Sesame Credit.

* 15. Is the Chinese social credit score system, Sesame Credit, voluntary or mandatory for citizens?

- ◯ Voluntary
- ◯ Mandatory

* 16. In the Chinese social credit score system, how do people earn points?

* 17. In the Chinese social credit score system, how do people lose points?

* 18. Is Sesame Credit an effective system, if so, why?

Informal Learning Study Pre Survey (M)

Section 5

The questions in this section are about implicit bias.

* 19. What are two examples of implicit bias?

* 20. Please select the correct answer.

	True	False
Bias is often the result of autopilot thinking.	○	○
All humans exhibit bias sometimes.	○	○
A person can genuinely believe that racism is wrong and still hold implicit racial bias.	○	○
Implicit racial bias can explain why someone might be quicker to see a gun when looking at a young black man.	○	○

Informal Learning Study Pre Survey (M)

Section 6

The questions in this section are about energy use.

* 21. Your city wants to develop a program to reduce people's electricity usage. Which message should your city include on the flyer in order to reduce people's energy consumption?

- ◯ Help the environment.
- ◯ Create a better world for the next generation of kids.
- ◯ Save yourself money.
- ◯ The majority of your neighbors have taken steps to reduce their energy use.

* 22. Why did you think the message you selected will work?

Informal Learning Study Pre Survey (M)

Clip 1 - Overarching HYM

Please watch the video clip below.

Informal Learning Study Pre Survey (M)

Clip 2 - How Can We Save the Planet

Please watch the video clip below.

Informal Learning Study Pre Survey (M)

Clip 3 - Can Governments Hack Your Mind

Please watch the video clip below.

Informal Learning Study Pre Survey (M)

Clip 4 - Can Cops Overcome Their Biases

Please watch the video clip below. When finished, access the post survey via the chat feature in Zoom.

Informal Learning Study Pre Survey (H)

Section 1

The questions in this section are about things you may have done in the past year.

* 1. Name (First and Last)

* 2. Email Address

* 3. In the past year did you visit...

	Yes	No
A library		
A museum		
A zoo		
An Aquarium		

* 4. In the past year did you...

	Yes	No
Listen to public radio		
Listen to a podcast		
Watch public television		
Study something in your free time		
Learn something new while reading		
Learn something new while watching a video		

RMC RESEARCH

Informal Learning Study Pre Survey (H)

Section 2

The questions in this section ask for your thoughts about science.

* 5. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Much of what I learned in science classes is useful in my everyday life today.	○	○	○	○
Learning science can help me when I pick food to buy.	○	○	○	○
Caring about people is part of making a science choice, such as whether to use pesticides on plants.	○	○	○	○
Science helps me make sensible decisions.	○	○	○	○

* 6. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The things I did in science classes have nothing to do with the real world.	○	○	○	○
Science helps me make decisions that could affect my body.	○	○	○	○
Learning science will have an effect on the way I vote in elections.	○	○	○	○
Making decisions can be difficult without reliable evidence.	○	○	○	○

* 7. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Scientific research is important.	○	○	○	○
Scientific research should be funded.	○	○	○	○

* 8. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would dislike being a scientist.	○	○	○	○
I would dislike a job in a science laboratory.	○	○	○	○
A career in science would be dull and boring.	○	○	○	○
A job as a scientist would be boring.	○	○	○	○

* 9. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would like to work with people who make discoveries in science.	○	○	○	○
I would like to teach science.	○	○	○	○
Working in a science laboratory would be an interesting way to earn a living.	○	○	○	○
A job as a scientist would be interesting.	○	○	○	○

* 10. Is there a scientific field that studies how people make decisions?

- ○ Yes
- ○ No
- ○ I don't know

Informal Learning Study Pre Survey (H)

Section 3

The questions in this section are about autopilot thinking.

* 11. Humans make the majority of their decisions using logical thought.

- ◯ True
- ◯ False

* 12. Which option describes decisions made “on autopilot”?

- ◯ Slow thinking, deliberate
- ◯ Logical, rational
- ◯ Fast thinking, snap judgements

* 13. When is autopilot thinking helpful?

* 14. When is autopilot thinking problematic?

Informal Learning Study Pre Survey (H)

Section 4

The questions in this section are about Sesame Credit.

* 15. Is the Chinese social credit score system, Sesame Credit, voluntary or mandatory for citizens?

- ◯ Voluntary
- ◯ Mandatory

* 16. In the Chinese social credit score system, how do people earn points?

* 17. In the Chinese social credit score system, how do people lose points?

* 18. Is Sesame Credit an effective system, if so, why?

Informal Learning Study Pre Survey (H)

Section 5

The questions in this section are about implicit bias.

* 19. What are two examples of implicit bias?

* 20. Please select the correct answer.

	True	False
Bias is often the result of autopilot thinking.	○	○
All humans exhibit bias sometimes.	○	○
A person can genuinely believe that racism is wrong and still hold implicit racial bias.	○	○
Implicit racial bias can explain why someone might be quicker to see a gun when looking at a young black man.	○	○

Informal Learning Study Pre Survey (H)

Section 6

The questions in this section are about energy use.

* 21. Your city wants to develop a program to reduce people's electricity usage. Which message should your city include on the flyer in order to reduce people's energy consumption?

- ◯ Help the environment.
- ◯ Create a better world for the next generation of kids.
- ◯ Save yourself money.
- ◯ The majority of your neighbors have taken steps to reduce their energy use.

* 22. Why did you think the message you selected will work?

Informal Learning Study Pre Survey (H)

Clip - Overarching HYM

Please watch the video clip below.

Informal Learning Study Pre Survey (H)

Episode 4

Please watch the episode below. When finished, access the post survey via the chat feature in Zoom.

Informal Learning Study Post Survey (M, H)

Section 1

The questions in this section ask about your thoughts on the video(s).

* 1. Name (First and Last)

* 2. Email Address

* 3. During these videos...

	Strongly Disagree	Disagree	Agree	Strongly Agree
I felt bored.				
I felt happy.				
I felt excited.				
I was daydreaming a lot.				
I was focused on the things we were learning most of the time.				
Time went by quickly.				
I was busy doing other things.				
I talked to others about stuff not related to what we were learning.				

* 4. Did anything in the videos surprise you? Please describe.

Informal Learning Study Post Survey (M, H)

Section 2

The questions in this section ask how you feel after viewing the video(s).

* 5. This experience has made me want to visit....

	Strongly Disagree	Disagree	Agree	Strongly Agree
A library	○	○	○	○
A museum	○	○	○	○
A zoo	○	○	○	○
An Aquarium	○	○	○	○

Other (please describe)

* 6. This experience has made me want to...

	Strongly Disagree	Disagree	Agree	Strongly Agree
Watch more of these types of shows.	○	○	○	○
Listen to public radio.	○	○	○	○
Listen to a podcast.	○	○	○	○
Watch public television.	○	○	○	○
Study something in my free time.	○	○	○	○
Learn something while reading.	○	○	○	○
Learn something new while watching a video.	○	○	○	○

* 7. This experience has made me want to learn more about...

	Strongly Disagree	Disagree	Agree	Strongly Agree
The video topics.				
Behavioral science.				
Science.				
How humans make decisions.				
The field of decision science.				

* 8. This experience has made me want to....

	Strongly Disagree	Disagree	Agree	Strongly Agree
Pursue a career in social, behavioral, or economic sciences.				

* 9. After watching these videos do you plan to...

	Strongly Disagree	Disagree	Agree	Strongly Agree
Reflect on how you make decisions?				
Discuss any of the topics with others?				
Search for more information about one of the interviewed scientists?				
Search for more information about any of the topics?				

Informal Learning Study Post Survey (M, H)

Section 3

The questions in this section ask for your thoughts about science.

* 10. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I want to learn more about science.	○	○	○	○
I like to engage in science-related hobbies in my free time.	○	○	○	○
I want to understand how processes in science work.	○	○	○	○
I often visit science-related websites.	○	○	○	○
I enjoy learning about new scientific discoveries or inventions.	○	○	○	○
Other people would describe me as a 'science person.'	○	○	○	○

* 11. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I am very interested in the sciences.	○	○	○	○
I enjoy reading about science-related topics.	○	○	○	○
I like to observe things in nature.	○	○	○	○
I enjoy talking about science topics with others.	○	○	○	○
I enjoy looking at information presented in scientific tables and graphs.	○	○	○	○

* 12. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Much of what I learned in science classes is useful in my everyday life today.	○	○	○	○
Learning science can help me when I pick food to buy.	○	○	○	○
Caring about people is part of making a science choice, such as whether to use pesticides on plants.	○	○	○	○
Science helps me make sensible decisions.	○	○	○	○

* 13. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
The things I did in science classes have nothing to do with the real world.	○	○	○	○
Science helps me make decisions that could affect my body.	○	○	○	○
Learning science will have an effect on the way I vote in elections.	○	○	○	○
Making decisions can be difficult without reliable evidence.	○	○	○	○

* 14. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Scientific research is important.	○	○	○	○
Scientific research should be funded.	○	○	○	○

* 15. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would dislike being a scientist.	○	○	○	○
I would dislike a job in a science laboratory.	○	○	○	○
A career in science would be dull and boring.	○	○	○	○
A job as a scientist would be boring.	○	○	○	○

* 16. Please indicate how much you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would like to work with people who make discoveries in science.	○	○	○	○
I would like to teach science.	○	○	○	○
Working in a science laboratory would be an interesting way to earn a living.	○	○	○	○
A job as a scientist would be interesting.	○	○	○	○

* 17. Is there a scientific field that studies how people make decisions?

- ○ Yes
- ○ No
- ○ I don't know

Informal Learning Study Post Survey (M, H)

Section 4

The questions in this section are about autopilot thinking.

* 18. Humans make the majority of their decisions using logical thought.

- ◯ True
- ◯ False

* 19. Which option describes decisions made 'on autopilot'?

- ◯ Slow thinking, deliberate
- ◯ Logical, rational
- ◯ Fast thinking, snap judgements

* 20. When is autopilot thinking helpful?

* 21. When is autopilot thinking problematic?

Informal Learning Study Post Survey (M, H)

Section 5

The questions in this section are about Sesame Credit.

* 22. Is the Chinese social credit score system, Sesame Credit, voluntary or mandatory for citizens?

- ◯ Voluntary
- ◯ Mandatory

* 23. In the Chinese social credit score system, how do people earn points?

* 24. In the Chinese social credit score system, how do people lose points?

* 25. Is Sesame Credit an effective system, if so, why?

Informal Learning Study Post Survey (M, H)

Section 6

The questions in this section are about implicit bias.

* 26. What are two examples of implicit bias?

* 27. Please select the correct answer.

	True	False
Bias is often the result of autopilot thinking.	○	○
All humans exhibit bias sometimes.	○	○
A person can genuinely believe that racism is wrong and still hold implicit racial bias.	○	○
Implicit racial bias can explain why someone might be quicker to see a gun when looking at a young black man.	○	○

Informal Learning Study Post Survey (M, H)

Section 7

The questions in this section are about energy use.

* 28. Your city wants to develop a program to reduce people's electricity usage. Which message should your city include on the flyer in order to reduce people's energy consumption?

- ◯ Help the environment.
- ◯ Create a better world for the next generation of kids.
- ◯ Save yourself money.
- ◯ The majority of your neighbors have taken steps to reduce their energy use.

* 29. Why did you think the message you selected will work?

Informal Learning Study Post Survey (M, H)

Section 8

The question in this section is about the overall theme of the video(s).

* 30. What does it mean to hack a human's mind, and why does it matter?

Informal Learning Study Post Survey (M, H)

Section 9

This section includes demographic questions.

31. What is your age?

32. What is your race/ethnicity? (Mark all that apply)

- [ ] American Indian or Alaska Native
- [ ] Asian
- [ ] Black or African American
- [ ] Native Hawaiian or other Pacific Islander
- [ ] White
- [ ] Hispanic
- [ ] Something else. Please describe.

33. What gender to you identify as?

34. What is the zip code where you live?

- Cronbach alpha for this study ***n* = 80, α = 0.077**
- **6 items**
    - What are two examples of implicit bias? *(open ended)*
    - Bias is often the result of autopilot thinking.
    - All humans exhibit bias sometimes.
    - A person can genuinely believe that racism is wrong and still hold implicit racial bias.
    - Implicit racial bias can explain why someone might be quicker to see a gun when looking at a young black man.
    - **Response Options:** True, False

UNDERSTANDING OF SOCIAL INFLUENCE TO CHANGE BEHAVIOR

- Developed by the HYM project.
- Cronbach alpha for this study ***n* = 80, α = 1.00**
- **2 items**
    - Your city wants to develop a program to reduce people's electricity usage. Which message should your city include on the flyer in order to reduce people's energy consumption?
        - Help the environment.
        - Create a better world for the next generation of kids.
        - Save yourself money.
        - The majority of your neighbors have taken steps to reduce their energy use.
    - Why did you think the message you selected will work? *(open ended)*

COMPOSITE ASSESSMENT SCORES

- Developed by the HYM project to assess overall content knowledge assessment scores. Composite scores were reported as the percentage of correct knowledge assessment items to ease interpretability. Because reliability was low, these items were also reported descriptively by individual item.
- Composite assessment score for common items in all three study groups (**L | M | H Assessment**). Cronbach alpha for this study ***n* = 121, α = 0.337**
    - **17 items** (items listed above in Knowledge of Autopilot Thinking, Knowledge of Sesame Credit, Understanding of Bias, and Understanding of Social Influence to Change Behavior, and "Is there a scientific field that studies how people make decisions?" [*yes, no, I don't know*])
- Composite assessment score for common items in medium and high-dose study groups (**M | H Assessment**). Cronbach alpha for this study ***n* = 80, α = 0.474**
    - **6 items** (items listed above in Knowledge of Autopilot Thinking, "Bias is often the result of autopilot thinking" [*true, false*], and "Is there a scientific field that studies how people make decisions?" [*yes, no, I don't know*])

Appendix C: Scale Reliability

This appendix shows how the research questions correspond to each survey scale, as well as the Cronbach's alpha score for each scale to determine the reliability and internal consistency for each scale. Cronbach's alpha scores range from 0 to 1, and the higher the score the higher the reliability of the scale. In general, Cronbach's alpha should be 0.70 or higher (a Cronbach's alpha of 0.70 indicates that the scale may be 70% reliable and 30% unreliable). Research has shown that summated multiple-item scales are more reliable than single items when measuring a construct. If the scale shows poor reliability, then individual items within the scale must be re-examined and modified or completely changed as needed.

Content Assessment Scales

KNOWLEDGE OF AUTO PILOT THINKING

- Developed by the HYM project but was not used in the analyses due to the low reliability. Instead the items were reported separately.
- Cronbach alpha for this study ***n* = 121, α = 0.304**
- **4 Items**
    - Humans make the majority of their decisions using logical thought.
        - **Response Options:** True, False
    - Which option describes decisions made "on autopilot"?
        - Slow thinking, deliberate
        - Logical, rational
        - Fast thinking, snap judgments
    - When is autopilot thinking helpful? *(open ended)*
    - When is autopilot thinking problematic? *(open ended)*

KNOWLEDGE OF SESAME CREDIT

- Developed by the HYM project but was not used in the analyses due to the low reliability. Instead the items were reported separately.
- Cronbach alpha for this study ***n* = 80, α = 0.439**
- **4 items**
    - Is the Chinese social credit score system, Sesame Credit, voluntary or mandatory for citizens?
        - **Response Options:** Voluntary, Mandatory
    - In the Chinese social credit score system, how do people earn points? *(open ended)*
    - In the Chinese social credit score system, how do people lose points? *(open ended)*
    - Why is Sesame Credit an effective system, if so, why? *(open ended)*

UNDERSTANDING OF BIAS

- Developed by the HYM project but was not used in the analyses due to the low reliability. Instead the items were reported separately.

Survey Scales

PARTICIPANT IN INFORMAL LEARNING ENVIRONMENT (PRE ONLY)

- Developed by the HYM project but was not used in the analyses due to the low reliability. Instead the items were reported separately rather than in an aggregate scale.
- Cronbach alpha for this study ***n* = 121, α = 0.260**
- **4 items**
    - In the past year did you visit:
    - Library
    - Museum
    - Zoos
    - Aquarium
- **Response Options:** Yes/No.

PARTICPANT IN INFORMAL LEARNING ACTIVITIES (PRE ONLY)

- Developed by the HYM project but was not used in the analyses due to the low reliability. Instead the items were reported separately rather than in an aggregate scale.
- Cronbach alpha for this study ***n* = 121, α = 0.439**
- **6 items**
    - In the past year did you learn about science by:
    - Listen to public radio
    - Listen to a podcast
    - Watch public television
    - Study something in your free time
    - Learn something new while reading
    - Learn something new while watching a video
- **Response Options:** Yes/No

COMPOSITE SCORE FOR PARTICIPANT IN INFORMAL LEARNING ENVIRONMENT AND PARTICPANT IN INFORMAL LEARNING ACTIVITIES (PRE ONLY)

- Developed by the HYM project but was not used in the analyses due to the low reliability. Instead the items were reported separately rather than in an aggregate scale.
- Cronbach alpha for this study ***n* = 121, α = 0.485**
- **10 items** listed above

INTEREST IN INFORMAL LEARNING ENVIRONMENTS (POST ONLY)

- Developed by the HYM project
- Cronbach alpha for this study ***n* = 128, α = 0.812**
- **4 items**
    - This experience made we want to visit a:
        - Library

        - Museum
        - Zoos
        - Aquarium
- **Response Options:** Yes/No.

INTEREST IN INFORMAL LEARNING ACTIVITIES (POST ONLY)

- Developed by the HYM project
- Cronbach alpha for this study ***n* = 128, α = 0.809**
- **6 items**
    - This experience has made me want to:
        - Watch more of these types of shows
        - Listen to public radio
        - Listen to a podcast
        - Watch public television
        - Study something in my free time
        - Learn something while reading
        - Learn something new while watching a video
- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

INTEREST IN LEARNING MORE ABOUT HYM TOPICS

- Developed by the HYM project
- Cronbach alpha for this study ***n* = 128, α = 0.858**
- **5 items**
    - This experience has made me want to learn more about:
        - The video topics
        - Behavioral science
        - Science
        - How humans make decisions
        - The field of decision science
- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

CAREER INTEREST IN SCIENCE

- Modified the Career Interest in Science Scale (**α = 0.85**).[18]
- Cronbach alpha for this study ***n* = 121, α = 0.911**
- **8 items**
    - I would dislike being a scientist*
    - I would dislike a job in a science laboratory*
    - A career in science would be dull and boring*
    - A just as a scientist would be boring*

[18]Fraser, B. J. (1981). Test of Science-Related Attitude. Melbourne: Australian Council for Educational Research

- I would like to work with people who make discoveries in science
- I would like to teach science
- Working in a science laboratory would be an interesting way to earn a living
- A job as a scientist would be interesting
- **Response Options:** Strongly disagree, disagree, agree, strongly agree
- ***Reverse coded**

CHANGE IN ATTITUDE ABOUT THE RELEVENCE OF SCIENCE (CARS)

- Modified *Changes in Attitude about the Relevance of Science (CARS) Scale*[19] (**α = 0.91)**
- Cronbach alpha for this study ***n* = 121, α = 0.807**
- **8 items**
  - Please indicate how much you agree with each statement.
  - Much of what I learned in science classes is useful in my everyday life today.
  - Learning science can help me when I pick food to buy.
  - Caring about people is part of making a science choice, such as whether to use pesticides on plants.
  - Science helps me make sensible decisions.
  - The things I did in science classes have nothing to do with the real world.
  - Science helps me make decisions that could affect my body.
  - Learning science will have an effect on the way I vote in elections.
  - Making decisions can be difficult without reliable evidence.
- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

IMPORTANCE OF SCIENTIFIC RESEARCH

- Developed by the HYM project
- Cronbach alpha for this study ***n* = 121, α = 0.772**
- **2 items**
  - Scientific research is important.
  - Scientific research should be funded.
- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

ANTICIPATED ACTIONS

- Modified behavior items from a Radiolab evaluation conducted by Flagg (2009)[20] (no Chronbach alpha reported).
- Cronbach alpha for this study ***n* = 128, α = 0.803**
- **4 items**
  - After watching these videos do you plan to:

[19]Siegel, M. A., & Ranney, M. A. (2003). Developing the Changes in Attitude about the Relevance of Science (CARS) questionnaire and assessing two high school science classes. *Journal of Research in Science Teaching, 40*(8), 757-775.
[20]Flagg, B. (2009). *Listeners' evaluation of Radiolab program: Choice* (Report No. 09-009). Belport, NY: Multimedia Research.

- Reflect on how you make decisions?
- Discuss any of the topics with others?
- Search for more information about one of the interviewed scientists?
- Search for more information about any of the topics?

- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

ENGAGEMENT IN SCIENCE LEARNING ACTIVITIES

- Modified scale from Engagement in Science Learning Activities scale developed by the Science Learning Activation Lab[21] **(α = 0.80)**
- Cronbach alpha for this study ***n* = 128, α = 0.797**
- **8 items**
- During these videos
  - I felt bored.
  - I felt happy.
  - I was daydreaming a lot.
  - I was focused on the things we were learning most of the time.
  - Time went by quickly.
  - I was busy doing other things.
  - I talked to others about stuff not related to what we were watching.
- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

SCIENCE PERSON

- Modified the Interest in Science scale developed by the Cornell Lab of Ornithology for project DEVISE,[22]
- Cronbach alpha for this study ***n* = 128, α = 0.925**
- **11 items**
  - I want to learn more about science.
  - I like to engage in science-related hobbies in my free time.
  - I want to understand how processes in science work.
  - I often visit science related websites.
  - I enjoy learning about new scientific discoveries or inventions.
  - Other people would describe me as a science person.
  - I am very interested in the sciences.
  - I enjoy reding about science-related topics.
  - I like to observe things in nature.
  - I enjoy talking about science topics with others.

[21]Chung, J., Cannady, M. A., Schunn, C., Dorph, R., & Bathgate, M. (2016). Measures technical brief: Engagement in science learning activities. Retrieved from: http://www.activationlab.org/wp-content/uploads/2016/02/ Engagement-Report-3.1-20160331.pdf

[22]Cornell Lab of Ornithology, Interest in Science, Adult Version. (2014). Survey Instrument Documentation. Retrieved from https://www.citizenscience.org/2014/09/12/evaluation-users-guide-to-evaluating-learning-outcomes/.

- I enjoy looking at information presented in scientific tables and graphs.

- **Response Options:** Strongly Disagree, somewhat disagree, somewhat agree, strongly agree.

Appendix D: Data Tables

Exhibit D1. What is your age?

Age	PRE-POST SAMPLE				POST ONLY SAMPLE			
	Low	Med.	High	Overall	Low	Med.	High	Overall
18	7%	4%	2%	5%	7%	4%	2%	5%
19	10%	7%	5%	7%	10%	7%	5%	7%
20	0%	4%	12%	6%	0%	4%	12%	6%
21	15%	11%	10%	12%	15%	11%	10%	12%
22	20%	17%	5%	14%	20%	17%	5%	14%
23	5%	7%	15%	9%	5%	7%	15%	9%
24	10%	9%	12%	10%	10%	9%	12%	10%
25	7%	7%	10%	8%	7%	7%	10%	8%
26	7%	9%	7%	8%	7%	9%	7%	8%
27	5%	4%	5%	5%	5%	4%	5%	5%
28	2%	2%	5%	3%	2%	2%	5%	3%
29	0%	2%	0%	1%	0%	2%	0%	1%
30	2%	2%	2%	2%	2%	2%	2%	2%
31	2%	7%	2%	4%	2%	7%	2%	4%
33	0%	0%	5%	2%	0%	0%	5%	2%
34	2%	2%	0%	2%	2%	2%	0%	2%
35	2%	0%	0%	1%	2%	0%	0%	1%
36	0%	2%	0%	1%	0%	2%	0%	1%
37	0%	2%	2%	2%	0%	2%	2%	2%
38	0%	0%	0%	1%	0%	0%	0%	1%
42	2%	0%	0%	1%	2%	0%	0%	1%
Summary Statistics for Responses								
Minimum	18	18	18	18	18	18	18	18
Maximum	42	38	37	42	42	38	37	42
Mean	23.93	24.72	24.24	24.31	23.93	24.72	24.24	24.31
Std. Dev.	4.937	4.956	4.170	4.687	4.937	4.956	4.170	4.687

Note. **Pre-Post Sample.** Low: n = 41, Medium: n = 39, High: n = 41. **Post Only Sample.** Low: n = 41, Medium: n = 46, High: n = 41.

Exhibit D2. What is your race/ethnicity? (Mark all that apply.)

Race/Ethnicity	PRE-POST SAMPLE				POST ONLY SAMPLE			
	Low	Med.	High	Overall	Low	Med.	High	Overall
American Indian or Alaska Native	0%	2%	0%	1%	0%	2%	0%	1%
Asian	22%	24%	17%	21%	22%	24%	17%	21%
Black or African American	17%	15%	10%	14%	17%	15%	10%	14%
Native Hawaiian or Other Pacific Islander	2%	2%	0%	2%	2%	2%	0%	2%
White	54%	57%	46%	52%	54%	57%	46%	52%
Hispanic	17%	17%	20%	18%	17%	17%	20%	18%
Something else (please describe)	5%	4%	10%	6%	5%	4%	10%	6%
Categories for Subgroup Analyses								
Underrepresented in STEM	32%	33%	29%	31%	32%	33%	29%	31%
Not underrepresented in STEM	68%	67%	66%	67%	68%	67%	66%	67%
Excluded from subgroup analyses	0%	0%	5%	2%	0%	0%	5%	2%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41. **Post Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41. Underrepresented in STEM (UR) includes American Indian or Alaska Native, Black or African American, Native Hawaiian or Other Pacific Islander, and Hispanic. "Something else" responses were coded qualitatively as UR or Non-UR.

Exhibit D3. What gender do you identify as?

Race/Ethnicity	PRE-POST SAMPLE				POST-ONLY SAMPLE			
	Low	Med.	High	Overall	Low	Med.	High	Overall
Female (cis-gender or trans-gender)	54%	54%	49%	52%	54%	54%	49%	52%
Male (cis-gender or trans-gender)	44%	39%	46%	43%	44%	39%	46%	43%
Non-binary or gender queer	0%	7%	5%	4%	0%	7%	5%	4%
Response can't be coded	2%	0%	0%	1%	2%	0%	0%	1%
Categories for Subgroup Analyses								
Female	54%	54%	49%	43%	54%	54%	49%	43%
Male	44%	39%	46%	52%	44%	39%	46%	52%
Excluded from subgroup analyses	2%	7%	5%	5%	2%	7%	5%	5%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41. One response, "heterosexual" could not be coded. Non-binary and gender queer participants were excluded from subgroup analyses by gender.

Exhibit D4. What is the zip code where you live?

Age	PRE-POST SAMPLE				POST-ONLY SAMPLE			
	Low	Med.	High	Overall	Low	Med.	High	Overall
AK	0%	2%	0%	1%	0%	2%	0%	1%
CA	34%	30%	44%	36%	34%	30%	44%	36%
CT	2%	2%	2%	2%	2%	2%	2%	2%
FL	7%	11%	2%	7%	7%	11%	2%	7%
GA	2%	4%	2%	3%	2%	4%	2%	3%
IA	0%	0%	2%	1%	0%	0%	2%	1%
IL	0%	4%	0%	2%	0%	4%	0%	2%
KY	2%	0%	0%	1%	2%	0%	0%	1%
LA	0%	2%	0%	1%	0%	2%	0%	1%
MD	2%	2%	0%	2%	2%	2%	0%	2%
ME	0%	2%	0%	1%	0%	2%	0%	1%
NJ	10%	7%	5%	7%	10%	7%	5%	7%
NV	0%	2%	0%	1%	0%	2%	0%	1%
NY	15%	11%	15%	13%	15%	11%	15%	13%
OH	2%	0%	0%	1%	2%	0%	0%	1%
OR	12%	13%	15%	13%	12%	13%	15%	13%
PA	0%	2%	7%	3%	0%	2%	7%	3%
TX	2%	2%	0%	2%	2%	2%	0%	2%
VA	2%	2%	2%	2%	2%	2%	2%	2%
WA	0%	0%	2%	1%	0%	0%	2%	1%
Region								
Northeast	27%	24%	29%	27%	27%	24%	29%	27%
South	20%	24%	7%	17%	20%	24%	7%	17%
Midwest	7%	4%	2%	5%	7%	4%	2%	5%
West	46%	48%	61%	52%	46%	48%	61%	52%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41. Regions are defined by the U.S. Census Bureau.

Exhibit D5. Interest in Science

This experience has made me want to learn more about . . .		PRE-POST SAMPLE				POST-ONLY SAMPLE			
		Low	Med.	High	Overall	Low	Med.	High	Overall
I want to learn more about science.	Strongly Disagree	0%	0%	2%	1%	0%	0%	2%	1%
	Disagree	7%	13%	15%	12%	7%	11%	15%	11%
	Agree	63%	46%	46%	52%	63%	52%	46%	54%
	Strongly Agree	29%	41%	37%	36%	29%	37%	37%	34%
I like to engage science-related hobbies in my free time.	Strongly Disagree	2%	3%	5%	3%	2%	2%	5%	3%
	Disagree	54%	31%	32%	39%	54%	26%	32%	37%
	Agree	20%	33%	46%	33%	20%	39%	46%	35%
	Strongly Agree	24%	33%	17%	25%	24%	33%	17%	25%
I want to understand how processes in science work.	Strongly Disagree	2%	3%	2%	3%	2%	2%	2%	2%
	Disagree	7%	18%	10%	12%	7%	20%	10%	13%
	Agree	66%	51%	59%	59%	66%	50%	59%	58%
	Strongly Agree	24%	28%	29%	27%	24%	28%	29%	27%
I often visit science-related websites.	Strongly Disagree	12%	13%	22%	16%	12%	11%	22%	15%
	Disagree	51%	36%	42%	43%	51%	41%	42%	45%
	Agree	20%	28%	22%	23%	20%	28%	22%	23%
	Strongly Agree	17%	23%	15%	18%	17%	20%	15%	17%
I enjoy learning about new scientific discoveries or inventions.	Strongly Disagree	0%	0%	5%	2%	0%	0%	5%	2%
	Disagree	5%	13%	2%	7%	5%	11%	2%	6%
	Agree	56%	44%	63%	55%	56%	48%	63%	56%
	Strongly Agree	39%	44%	29%	37%	39%	41%	29%	37%
Other people would describe me as a "science person."	Strongly Disagree	32%	18%	22%	24%	32%	15%	22%	23%
	Disagree	32%	33%	39%	35%	32%	39%	39%	37%
	Agree	22%	26%	27%	25%	22%	24%	27%	24%
	Strongly Agree	15%	23%	12%	17%	15%	22%	12%	16%
I am very interested in the sciences.	Strongly Disagree	5%	0%	2%	3%	5%	0%	2%	2%
	Disagree	29%	21%	32%	27%	29%	22%	32%	27%
	Agree	42%	39%	39%	40%	42%	39%	39%	40%
	Strongly Agree	24%	41%	27%	31%	24%	39%	27%	31%
I enjoy reading about science-related topics.	Strongly Disagree	2%	0%	2%	2%	2%	0%	2%	2%
	Disagree	17%	26%	17%	20%	17%	26%	17%	20%
	Agree	59%	41%	51%	50%	59%	39%	51%	49%
	Strongly Agree	22%	33%	29%	28%	22%	35%	29%	29%

Exhibit D5 continues . . .

Exhibit D5 (continued)

This experience has made me want to learn more about . . .		PRE-POST SAMPLE				POST-ONLY SAMPLE			
		Low	Med.	High	Overall	Low	Med.	High	Overall
I like to observe things in nature.	Strongly Disagree	0%	3%	2%	2%	0%	2%	2%	2%
	Disagree	10%	8%	5%	7%	10%	7%	5%	7%
	Agree	54%	39%	42%	45%	54%	39%	42%	45%
	Strongly Agree	37%	51%	51%	46%	37%	52%	51%	47%
I enjoy talking about science topics with others.	Strongly Disagree	7%	3%	2%	4%	7%	2%	2%	4%
	Disagree	22%	18%	15%	18%	22%	15%	15%	17%
	Agree	44%	39%	54%	46%	44%	44%	54%	47%
	Strongly Agree	27%	41%	29%	32%	27%	39%	29%	32%
I enjoy looking at information presented in scientific tables and graphs.	Strongly Disagree	10%	5%	12%	9%	10%	4%	12%	9%
	Disagree	27%	18%	10%	18%	27%	15%	10%	17%
	Agree	44%	56%	54%	51%	44%	59%	54%	52%
	Strongly Agree	20%	21%	24%	22%	20%	22%	24%	22%
Summary Statistics for Scale Score									
Minimum		1.55	1.73	1.18	1.18	1.55	1.73	1.18	1.18
Maximum		4.00	4.00	3.91	4.00	4.00	4.00	3.91	4.00
Mean		2.88	3.05	2.93	2.95	2.88	3.05	2.93	2.96
Std. Dev.		0.642	0.628	0.577	0.615	0.642	0.596	0.577	0.605
Categories for Subgroup Analyses									
Science person		71%	77%	76%	74%	71%	80%	76%	76%
Non-science person		29%	23%	24%	26%	29%	20%	24%	24%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41. A participant is classified as a "science person" if they have a mean score > 2.50.

Exhibit D6. Informal Learning Environment Participant

In the past year did you visit . . .	PRE			
	Low	Med.	High	Overall
. . . a library?	90%	90%	95%	92%
. . . a museum?	78%	82%	73%	78%
. . . a zoo?	39%	46%	29%	38%
. . . an aquarium?	34%	36%	20%	30%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.

Exhibit D7. Informal Learning Activity Participant

In the past year did you . . .	PRE			
	Low	Med.	High	Overall
. . . listen to public radio?	85%	82%	85%	84%
. . . listen to a podcast?	93%	95%	98%	95%
. . . watch public television?	76%	77%	73%	75%
. . . study something in their free time?	95%	97%	98%	97%
. . . learn something new while reading?	93%	97%	93%	94%
. . . learn something new while watching a video?	100%	97%	100%	99%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.

Exhibit D8. Career Interest in Science

Please indicate how much you agree or disagree with each statement.		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
*I would dislike being a scientist.	Strongly Disagree	27%	33%	17%	26%	22%	31%	32%	28%
	Disagree	46%	36%	51%	45%	44%	33%	42%	40%
	Agree	20%	21%	24%	22%	27%	23%	24%	25%
	Strongly Agree	7%	10%	7%	8%	7%	13%	2%	7%
*I would dislike a job in a science laboratory.	Strongly Disagree	29%	31%	17%	26%	24%	26%	27%	26%
	Disagree	32%	33%	37%	34%	32%	33%	39%	35%
	Agree	27%	26%	39%	31%	37%	26%	32%	31%
	Strongly Agree	12%	10%	7%	10%	7%	15%	2%	8%
*A career in science would be dull and boring.	Strongly Disagree	39%	36%	34%	36%	37%	31%	42%	36%
	Disagree	49%	44%	56%	50%	56%	51%	46%	51%
	Agree	10%	18%	7%	12%	7%	18%	10%	12%
	Strongly Agree	2%	3%	2%	3%	0%	0%	2%	1%
*A job as a scientist would be boring.	Strongly Disagree	32%	36%	32%	33%	39%	33%	42%	38%
	Disagree	51%	41%	54%	49%	46%	49%	46%	48%
	Agree	15%	18%	12%	15%	12%	15%	10%	12%
	Strongly Agree	2%	5%	2%	3%	2%	3%	2%	3%
I would like to work with people who make discoveries in science.	Strongly Disagree	2%	0%	2%	2%	2%	0%	2%	2%
	Disagree	24%	18%	17%	20%	22%	13%	10%	15%
	Agree	46%	46%	56%	50%	51%	49%	61%	54%
	Strongly Agree	27%	36%	24%	29%	24%	39%	27%	30%

Exhibit D8 continues . . .

Exhibit D8 (continued)

Please indicate how much you agree or disagree with each statement.		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
I would like to teach science.	Strongly Disagree	17%	15%	22%	18%	27%	21%	22%	23%
	Disagree	49%	41%	54%	48%	37%	36%	44%	39%
	Agree	20%	31%	15%	22%	20%	31%	12%	21%
	Strongly Agree	15%	13%	10%	12%	17%	13%	22%	17%
Working in a science laboratory would be an interesting way to earn a living.	Strongly Disagree	0%	5%	5%	3%	2%	0%	2%	2%
	Disagree	24%	13%	24%	21%	17%	21%	20%	19%
	Agree	49%	54%	46%	50%	54%	51%	54%	53%
	Strongly Agree	27%	28%	24%	26%	27%	29%	24%	26%
A job as a scientist would be interesting.	Strongly Disagree	2%	0%	5%	3%	0%	0%	2%	1%
	Disagree	12%	21%	10%	14%	12%	15%	10%	12%
	Agree	49%	54%	56%	53%	56%	44%	59%	53%
	Strongly Agree	37%	26%	29%	31%	32%	41%	29%	34%
Summary Statistics for Scale Score									
Minimum		1.25	1.38	1.00	1.00	1.50	1.88	1.00	1.00
Maximum		4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean		2.95	2.96	2.87	2.92	2.94	2.96	3.01	2.97
Std. Dev.		0.673	0.675	0.592	0.643	0.618	0.646	0.644	0.631

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41. *Reverse-coded for scale score.

Exhibit D9. Change in Attitude About the Relevance of Science

Please indicate how much you agree or disagree with each statement.		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Much of what I learned in science classes is useful in my everyday life today.	Strongly Disagree	5%	3%	7%	5%	7%	8%	10%	8%
	Disagree	37%	36%	37%	36%	39%	36%	22%	32%
	Agree	51%	39%	44%	45%	39%	28%	44%	37%
	Strongly Agree	7%	23%	12%	14%	15%	28%	24%	22%
Learning science can help me when I pick food to buy.	Strongly Disagree	2%	0%	2%	2%	2%	0%	5%	3%
	Disagree	12%	15%	17%	15%	7%	10%	7%	8%
	Agree	68%	56%	44%	56%	59%	56%	49%	55%
	Strongly Agree	17%	28%	37%	27%	32%	33%	39%	35%
Caring about people is part of making a science choice, such as whether to use pesticides on plants.	Strongly Disagree	2%	3%	2%	3%	0%	3%	2%	2%
	Disagree	7%	13%	10%	10%	10%	10%	5%	8%
	Agree	63%	56%	42%	54%	63%	59%	37%	53%
	Strongly Agree	27%	28%	46%	34%	27%	28%	56%	37%

Exhibit D9 continues . . .

Exhibit D9 (continued)

Please indicate how much you agree or disagree with each statement.		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Science helps me make sensible decisions.	Strongly Disagree	5%	0%	2%	3%	0%	0%	2%	1%
	Disagree	7%	13%	10%	10%	5%	3%	5%	4%
	Agree	49%	39%	37%	41%	61%	49%	32%	47%
	Strongly Agree	39%	49%	51%	46%	34%	49%	61%	48%
*The things I did in science classes have nothing to do with the real world.	Strongly Disagree	22%	33%	44%	33%	27%	28%	32%	29%
	Disagree	59%	51%	37%	49%	59%	49%	56%	55%
	Agree	17%	13%	20%	17%	15%	18%	7%	13%
	Strongly Agree	2%	3%	0%	2%	0%	5%	5%	3%
Science helps me make decisions that could affect my body.	Strongly Disagree	0%	0%	2%	1%	0%	0%	5%	2%
	Disagree	2%	3%	0%	2%	2%	5%	2%	3%
	Agree	56%	51%	39%	49%	59%	49%	44%	50%
	Strongly Agree	42%	46%	59%	49%	39%	46%	49%	45%
Learning science will have an effect on the way I vote in elections.	Strongly Disagree	7%	11%	5%	7%	7%	8%	5%	7%
	Disagree	17%	18%	17%	17%	15%	18%	7%	13%
	Agree	49%	36%	34%	40%	51%	39%	44%	45%
	Strongly Agree	27%	36%	44%	36%	27%	36%	44%	36%
Making decisions can be difficult without reliable evidence.	Strongly Disagree	0%	0%	0%	0%	0%	0%	5%	2%
	Disagree	0%	0%	2%	1%	5%	8%	0%	4%
	Agree	44%	46%	27%	39%	49%	41%	34%	41%
	Strongly Agree	56%	54%	71%	60%	46%	51%	61%	53%
Summary Statistics for Scale Score									
Minimum		2.00	2.00	2.13	2.00	2.63	2.25	1.75	1.75
Maximum		3.75	4.00	4.00	4.00	3.75	4.00	4.00	4.00
Mean		3.11	3.19	3.26	3.19	3.14	3.18	3.29	3.21
Std. Dev.		0.383	0.487	0.525	0.469	0.307	0.460	0.485	0.425

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.
*Reverse-coded for scale score.

Exhibit D10. Is there a scientific field that studies how people make decisions?

Response	PRE				POST			
	Low	Med.	High	Overall	Low	Med.	High	Overall
Correct (Yes)	83%	82%	76%	80%	98%	100%	98%	98%
Incorrect (No; I don't know)	17%	18%	24%	20%	2%	0%	2%	2%

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.

Exhibit D11. Knowledge of Autopilot Thinking

Item		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Humans make the majority of their decisions using logical thought.	Correct (False)	81%	69%	63%	71%	81%	80%	85%	82%
	Incorrect (True)	20%	31%	37%	29%	20%	21%	15%	18%
Which option describes decisions made "on autopilot"?	Correct (Fast thinking, snap judgments)	90%	87%	95%	91%	95%	97%	98%	97%
	Incorrect (Slow thinking, deliberate; logical, rational)	10%	13%	5%	9%	5%	3%	2%	3%
When is autopilot thinking helpful?	Correct (qual. coding)	98%	97%	100%	98%	100%	97%	98%	98%
	Incorrect (qual. coding)	2%	3%	0%	2%	0%	3%	2%	2%
Making decisions can be difficult without reliable evidence.	Correct (qual. coding)	98%	100%	95%	98%	95%	97%	98%	97%
	Incorrect (qual. coding)	2%	0%	5%	3%	5%	3%	2%	3%
Summary Statistics for Scale Score									
Minimum		2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00
Maximum		4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean		3.67	3.54	3.54	3.59	3.71	3.72	3.78	3.74
Std. Dev.		0.647	0.682	0.674	0.655	0.559	0.560	0.613	0.574

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.

Exhibit D12. Knowledge of Sesame Credit

Item		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Is the Chinese social credit system, Sesame Credit, voluntary or mandatory for citizens?	Correct (Voluntary)	—	36%	15%	25%	—	69%	71%	70%
	Incorrect (Mandatory)	—	64%	85%	75%	—	31%	29%	30%
In the Chinese social credit score system, how do people earn points?	Correct (qual. coding)	—	41%	22%	31%	—	90%	93%	86%
	Incorrect (qual. coding)	—	59%	78%	69%	—	10%	17%	14%
In the Chinese social credit score system, how do people lose points?	Correct (qual. coding)	—	64%	42%	53%	—	100%	95%	98%
	Incorrect (qual. coding)	—	36%	59%	48%	—	0%	5%	3%

Exhibit D12 continues . . .

Exhibit D12 (continued)

Item		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Summary Statistics for Scale Score									
Is Sesame Credit an effective system? If so, why?	Correct (qual. coding)	—	13%	24%	19%	—	67%	68%	68%
	Incorrect (qual. coding)	—	87%	76%	81%	—	33%	32%	33%
Minimum		—	0.00	0.00	0.00	—	1.00	0.00	0.00
Maximum		—	3.00	4.00	4.00	—	4.00	4.00	4.00
Mean		—	1.54	1.02	1.28	—	3.26	3.17	3.21
Std. Dev.		—	0.942	1.190	1.102	—	0.850	0.998	0.924

Note. **Pre-Post Sample.** Medium: *n* = 39, High: *n* = 41. These items were not included on the assessment for the Low Dose study group.

Exhibit D13. Understanding of Bias

Item		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
What are two examples of implicit bias?	Correct (qual. coding)	—	77%	85%	81%	—	97%	98%	98%
	Incorrect (qual. coding)	—	23%	15%	19%	—	3%	2%	3%
Bias is often the result of autopilot thinking.	Correct (True)	93%	95%	90%	93%	95%	100%	98%	98%
	Incorrect (False)	7%	5%	10%	7%	5%	0%	2%	3%
All humans exhibit bias sometimes.	Correct (True)	—	100%	100%	100%	—	97%	98%	99%
	Incorrect (False)	—	0%	0%	0%	—	3%	2%	1%
A person can genuinely believe that racism is wrong and still hold implicit racial bias.	Correct (True)	—	100%	100%	100%	—	97%	98%	99%
	Incorrect (False)	—	0%	0%	0%	—	3%	2%	1%
Implicit racial bias can explain why someone might be quicker to see a gun when looking at a young black man.	Correct (True)	—	100%	98%	99%	—	97%	98%	98%
	Incorrect (False)	—	0%	2%	1%	—	3%	2%	3%
Summary Statistics for Scale Score									
Minimum		—	3.00	4.00	3.00	—	2.00	4.00	2.00
Maximum		—	5.00	5.00	5.00	—	5.00	5.00	5.00
Mean		—	4.72	4.73	4.73	—	4.90	4.93	4.91
Std. Dev.		—	0.560	0.449	0.503	—	0.502	0.264	0.396

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41. Only 1 of these items ("Bias is often the result of autopilot thinking) was included on the assessment for the Low Dose study group.

Exhibit D14. Understanding of Social Influence to Change Behavior

Item		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Your city wants to develop a program to reduce people's electricity usage. Which message should your city include on the flyer in order to reduce people's energy consumption?	Correct (The majority of your neighbors have taken steps to reduce their energy use)	—	26%	27%	26%	—	87%	81%	84%
	Incorrect (Help the environment; create a better world for the next generation of kids; save yourself money)	—	74%	73%	74%	—	13%	20%	16%
Why did you think the message you selected will work?	Correct (qual. coding)	—	26%	27%	26%	—	85%	78%	81%
	Incorrect (qual. coding)	—	74%	73%	74%	—	15%	22%	19%
Summary Statistics for Scale Score									
Minimum		—	0.00	0.00	0.00	—	0.00	0.00	0.00
Maximum		—	2.00	2.00	2.00	—	2.00	2.00	2.00
Mean		—	0.51	0.54	0.53	—	1.72	1.59	1.65
Std. Dev.		—	0.885	0.897	0.889	—	0.686	0.805	0.748

Note. **Pre-Post Sample.** Medium: *n* = 39, High: *n* = 41. These items were not included on the assessment for the Low Dose study group.

Exhibit D15. Composite Knowledge Score for Common Items for Low, Medium, and High Dose Groups

Statistic	PRE				POST			
	Low	Med.	High	Overall	Low	Med.	High	Overall
Summary Statistics for Scale Score								
Minimum	3.00	4.00	4.00	3.00	3.00	4.00	3.00	3.00
Maximum	7.00	7.00	7.00	7.00	6.00	6.00	6.00	6.00
Mean	5.76	5.67	5.68	5.71	5.68	5.72	5.78	5.73
Std. Dev.	0.888	0.662	0.722	0.760	0.650	0.560	0.571	0.592

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.

Exhibit D16. Composite Knowledge Score for Common Items for Medium and High Dose Groups

Statistic	PRE				POST			
	Low	Med.	High	Overall	Low	Med.	High	Overall
Summary Statistics for Scale Score								
Minimum	—	8.00	8.00	8.00	—	10.00	9.00	9.00
Maximum	—	15.00	16.00	16.00	—	16.00	16.00	16.00
Mean	—	11.49	11.07	11.28	—	14.59	14.49	14.53
Std. Dev.	—	1.715	1.780	1.750	—	1.712	1.846	1.771

Note. **Pre-Post Sample.** Medium: *n* = 39, High: *n* = 41. These items were not all included on the assessment for the Low Dose study group.

Exhibit D17. Importance of Scientific Research

Please indicate how much you agree or disagree with each statement.		PRE				POST			
		Low	Med.	High	Overall	Low	Med.	High	Overall
Scientific research is important.	Strongly Disagree	2%	0%	0%	1%	0%	0%	0%	0%
	Disagree	0%	0%	0%	0%	0%	0%	0%	0%
	Agree	2%	26%	17%	15%	10%	21%	20%	17%
	Strongly Agree	95%	74%	83%	84%	90%	80%	81%	84%
Scientific research should be funded.	Strongly Disagree	5%	0%	0%	2%	2%	0%	0%	1%
	Disagree	0%	3%	2%	2%	0%	0%	0%	0%
	Agree	2%	23%	20%	15%	10%	23%	17%	17%
	Strongly Agree	93%	74%	78%	82%	88%	77%	83%	83%
Summary Statistics for Scale Score									
Minimum		1.00	2.50	3.00	1.00	2.50	3.00	3.00	2.50
Maximum		4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Mean		3.87	3.73	3.79	3.80	3.87	3.78	3.82	3.82
Std. Dev.		0.536	0.457	0.353	0.455	0.371	0.410	0.367	0.381

Note. **Pre-Post Sample.** Low: *n* = 41, Medium: *n* = 39, High: *n* = 41.

Exhibit D18. What does it mean to hack a human's mind, and why does it matter?

Response	POST			
	Low	Med.	High	Overall
Correct (qual. coding)	100%	100%	100%	100%
Incorrect (qual. coding)	0%	0%	0%	0%

Note. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41.

Exhibit D19. Anticipated Actions

After watching these videos do you plan to . . .		POST			
		Low	Med.	High	Overall
Reflect on how you make decisions?	Strongly Disagree	2%	0%	2%	2%
	Disagree	7%	13%	5%	8%
	Agree	81%	54%	44%	60%
	Strongly Agree	10%	33%	49%	31%
Discuss any of the topics with others?	Strongly Disagree	5%	0%	0%	2%
	Disagree	29%	8%	15%	17%
	Agree	61%	44%	32%	46%
	Strongly Agree	5%	49%	54%	36%
Search for more information about one of the interviewed scientists?	Strongly Disagree	15%	5%	10%	10%
	Disagree	51%	23%	22%	32%
	Agree	24%	41%	39%	35%
	Strongly Agree	10%	31%	29%	23%
Search for more information about any of the topics?	Strongly Disagree	5%	0%	5%	3%
	Disagree	12%	5%	10%	9%
	Agree	71%	54%	49%	58%
	Strongly Agree	12%	41%	37%	30%
Summary Statistics for Scale Score					
Minimum		1.00	2.00	1.75	1.00
Maximum		4.00	4.00	4.00	4.00
Mean		2.71	3.24	3.21	3.05
Std. Dev.		0.515	0.529	0.637	0.610

Note. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41.

Exhibit D20. Interest in Learning More About HYM Topics

This experience has made me want to learn more about . . .		POST			
		Low	Med.	High	Overall
. . . the video topics.	Strongly Disagree	0%	0%	2%	1%
	Disagree	12%	7%	7%	9%
	Agree	61%	61%	54%	59%
	Strongly Agree	27%	33%	37%	32%
. . . behavioral science.	Strongly Disagree	0%	0%	2%	1%
	Disagree	7%	2%	2%	4%
	Agree	56%	61%	54%	57%
	Strongly Agree	37%	37%	42%	38%
. . . science.	Strongly Disagree	0%	2%	2%	2%
	Disagree	29%	24%	22%	25%
	Agree	56%	50%	51%	52%
	Strongly Agree	15%	24%	24%	21%
. . . how humans make decisions.	Strongly Disagree	0%	0%	2%	1%
	Disagree	2%	7%	0%	3%
	Agree	56%	54%	42%	51%
	Strongly Agree	42%	39%	56%	45%
. . . the field of decision science.	Strongly Disagree	0%	0%	2%	1%
	Disagree	10%	4%	2%	6%
	Agree	59%	61%	54%	58%
	Strongly Agree	32%	35%	42%	36%
Summary Statistics for Scale Score					
Minimum		2.00	2.20	1.00	1.00
Maximum		4.00	4.00	4.00	4.00
Mean		3.18	3.24	3.28	3.23
Std. Dev.		0.485	0.441	0.585	0.503

Note. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41.

Exhibit D21. This experience has made me want to pursue a career in social, behavioral, and economic sciences.

Response	POST			
	Low	Med.	High	Overall
Strongly Disagree	15%	9%	20%	14%
Disagree	56%	57%	54%	56%
Agree	20%	28%	20%	23%
Strongly Agree	10%	7%	7%	8%

Note. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41.

Exhibit D22. Interest in Informal Learning Activities

This experience has made me want to . . .		POST			
		Low	Med.	High	Overall
. . . watch more of these types of shows.	Strongly Disagree	0%	0%	5%	2%
	Disagree	17%	15%	20%	17%
	Agree	56%	52%	39%	49%
	Strongly Agree	27%	33%	37%	32%
. . . listen to public radio.	Strongly Disagree	5%	11%	20%	12%
	Disagree	76%	54%	37%	56%
	Agree	15%	22%	24%	20%
	Strongly Agree	5%	13%	20%	13%
. . . listen to a podcast.	Strongly Disagree	2%	4%	5%	4%
	Disagree	20%	33%	17%	23%
	Agree	54%	37%	51%	47%
	Strongly Agree	24%	26%	27%	26%
. . . watch public television.	Strongly Disagree	5%	2%	24%	10%
	Disagree	73%	54%	42%	56%
	Agree	10%	37%	27%	25%
	Strongly Agree	12%	7%	7%	9%
. . . study something in my free time.	Strongly Disagree	0%	0%	2%	1%
	Disagree	15%	11%	10%	12%
	Agree	56%	52%	42%	50%
	Strongly Agree	29%	37%	46%	38%
. . . learn something while reading.	Strongly Disagree	0%	0%	2%	1%
	Disagree	7%	13%	17%	13%
	Agree	59%	54%	34%	49%
	Strongly Agree	34%	33%	46%	38%
. . . learn something while watching a video.	Strongly Disagree	0%	0%	0%	0%
	Disagree	10%	13%	10%	11%
	Agree	54%	30%	42%	41%
	Strongly Agree	37%	57%	49%	48%
Summary Statistics for Scale Score					
Minimum		2.00	2.00	1.71	1.71
Maximum		4.00	4.00	4.00	4.00
Mean		2.90	2.97	2.95	2.94
Std. Dev.		0.467	0.482	0.589	0.511

Note. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41.

Exhibit D23. Engagement in Informal Learning Activity

During the video . . .		POST			
		Low	Med.	High	Overall
*I felt bored.	Strongly Disagree	20%	33%	42%	31%
	Disagree	63%	46%	37%	49%
	Agree	15%	18%	20%	17%
	Strongly Agree	2%	3%	2%	3%
I felt happy.	Strongly Disagree	0%	8%	5%	4%
	Disagree	61%	54%	49%	55%
	Agree	34%	31%	42%	36%
	Strongly Agree	5%	8%	5%	6%
I felt excited.	Strongly Disagree	0%	3%	2%	2%
	Disagree	46%	39%	34%	40%
	Agree	46%	46%	42%	45%
	Strongly Agree	7%	13%	22%	14%
*I was daydreaming a lot.	Strongly Disagree	15%	31%	22%	22%
	Disagree	66%	54%	56%	59%
	Agree	17%	13%	17%	16%
	Strongly Agree	2%	3%	5%	3%
I was focused on the things we were learning most of the time.	Strongly Disagree	0%	0%	0%	0%
	Disagree	10%	5%	7%	7%
	Agree	73%	59%	46%	60%
	Strongly Agree	17%	36%	46%	33%
Time went by quickly.	Strongly Disagree	0%	0%	5%	2%
	Disagree	32%	18%	32%	27%
	Agree	51%	51%	37%	46%
	Strongly Agree	17%	31%	27%	25%
*I was busy doing other things.	Strongly Disagree	39%	44%	39%	41%
	Disagree	54%	49%	49%	50%
	Agree	7%	8%	10%	8%
	Strongly Agree	0%	0%	2%	1%
*I talked to others about stuff not related to what we were learning.	Strongly Disagree	59%	64%	56%	60%
	Disagree	39%	33%	37%	36%
	Agree	2%	3%	7%	4%
	Strongly Agree	0%	0%	0%	0%

Exhibit D23 continues . . .

Exhibit D23 (continued)

Summary Statistics for Scale Score				
Minimum	2.25	2.13	1.63	1.63
Maximum	3.75	4.00	4.00	4.00
Mean	2.97	3.09	3.05	3.04
Std. Dev.	0.370	0.424	0.518	0.441

Note. **Post-Only Sample.** Low: *n* = 41, Medium: *n* = 46, High: *n* = 41.
*Reverse-coded for scale score.