THE SCULLY EFFECT: I WANT TO BELIEVE IN STEM

Research by 21st Century Fox, Geena Davis Institute on Gender in Media, and J. Walter Thompson Intelligence

INTRODUCTION

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In the late 1990s, one name was synonymous with a medical doctor-turned-paranormal detective: Dana Scully. Played by actor Gillian Anderson, Dr. Dana Scully made her mark on millions of fans who tuned in every week to watch *The X-Files*, a hit science-fiction drama that aired on FOX for nine seasons from 1993 to 2002, before returning to TV in 2016. Scully was one of the first multidimensional female characters in a science, technology, engineering, and mathematics (STEM) field to be featured on a popular television show, and the first to play a leading role. She is known for her objectivity, skepticism, confidence, and brilliance. In the world of entertainment media, where scientists are often portrayed as white men wearing white coats and working alone in labs, Scully stood out in the 1990s as the only female STEM character in a prominent, prime time television role.

This report presents the findings of the first systematic study of the influence of Dana Scully on girls and women pertaining to STEM – the "Scully Effect." The primary questions of this research are whether Scully's character improved women's perceptions of STEM fields, whether she inspired girls and women to go into a STEM profession, and whether female viewers see Scully as a role model. The study was conducted by 21st Century Fox, the Geena Davis Institute on Gender in Media, and J. Walter Thompson Intelligence.

BACKGROUND

Women have advanced rapidly in many professional roles since the 1970s, but remain underrepresented in STEM professions.[1] Women constitute about half (48%) of the college-educated workforce in the U.S., but hold less than a quarter (24%) of jobs in STEM.[2] Only 10% of graduate degrees earned by women are in STEM fields, compared to 24% of graduate degrees earned by men.[3]

Research from the past decade definitively shows that gender differences in ability do not account for the gender gap in STEM.[4] St have identified many causes of the STEM gender gap, inc g stereotypes, lack of early encouragement from parents and

teachers, and gender discrimination in STEM fields.[5] Among the factors identified as contributing to this gender gap is a stereotype frequently rendered in entertainment media: that of a lone, "nerdy" scientist in a lab coat, commonly portrayed as a "mad scientist" or a socially awkward white man.[6] This portrayal reinforces the belief that science is a male pursuit, one that is held by many children, adolescents, and adults.[7] Children start implicitly pairing men and math as early as age seven,[8] a bias that continues into adulthood.[9] In the 1990s, Scully was a sharp departure from the gendered stereotype of a scientist. Her character blends traditional norms of femininity and masculinity to portray a brave, even-keeled field agent who serves as a counter-balance to her quirky and sometimes erratic partner, Fox Mulder. She is the logical and skeptical half of the duo, constantly defying the 'damsel in distress' stereotype by saving the day with her wits and weapon.

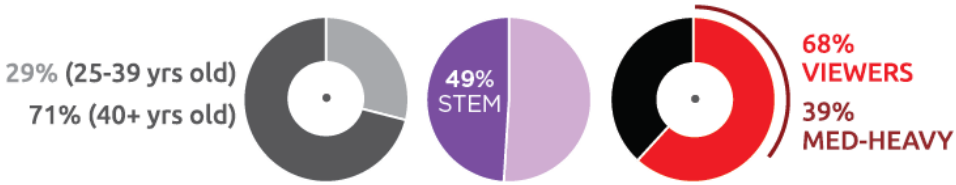
Scully's media depiction of a high-achieving woman in STEM asked a generation of girls and women to imagine new professional options. Commentators have speculated about the "Scully Effect" for two decades – the term coined for this phenomenon – but this is the first research study to evidentially confirm it. Women in our study report that Scully's character influenced their perceptions of, aspiration for, and involvement in STEM. Beyond paving the way for other characters like her in media (e.g., *Bones'* Dr. Temperance "Bones" Brennan, Veronica Mars, *Alias's* Sydney Bristow, and *Firefly's* Zoe Washburne10), Scully also influenced a generation of young women to study and pursue careers in STEM.

Methodology

To assess the "Scully Effect," we conducted an online survey from February 15 to February 20, 2018, using an opt-in sample of 2,021 participants. The survey was administered by J. Walter Thompson Intelligence, a global firm specializing in data, research, insight, trends and innovation. The sample was demographically representative and weighted to be representative of women in the U.S. population based on age (25 and older), STEM involvement, and viewing of *The X-Files*. We designed the sample in four specific ways to in order to accurately test the "Scully Effect." First, we only recruited women participants because the purpose of the research is to test the effect of a female character on women specifically. Secondly, we only included women ages 25 and older to ensure that respondents were old enough to watch either the original *The X-Files* run or the current seasons and were of age to have entered the post-college workforce. Thus, we were able to measure actual participation in a STEM occupation rather than intention to enter STEM. Thirdly, we oversampled women working in STEM fields in order to more accurately test the "Scully Effect" on women who actually went into STEM. Lastly, we oversampled viewers of *The X-Files* to obtain a large enough sample of this group from which to draw statistically significant conclusions. Oversampling both STEM professionals and viewers of *The X-Files* was necessary for accurately measuring the influence of Scully's character.11

About one-third (29%) of respondents were aged 25 to 39, while the re er (71%) were aged 40 or older. Roughly half (49%) of the sa studied a STEM field in college, or currently works in STEM.

Two-thirds of respondents (68%) had seen at least one episode of *The X-Files*, which speaks to the show's wide reach. Throughout this report, we break our analysis into two primary groups: non/light viewers (61% of the sample) who have watched fewer than eight episodes and medium/heavy viewers (39% of the sample) who have seen the show eight or more times. This breakdown allows us to isolate the impact of viewing *The X-Files* on a regular basis. All differences reported here are statistically significant at the .10 level.



Findings

We find significant evidence of the "Scully Effect" when it comes to attitudes toward STEM, working in a STEM field, and viewing Scully as a role model. We analyze each of these topics in turn.

Attitudes Toward STEM: Scully Spurs STEM Interest

Women who are medium/heavy watchers of *The X-Files* hold more positive views of STEM than non/light watchers, and several survey questions link this directly to the influence of Scully's character.

- Nearly two-thirds (63%) of women who are familiar with Dana Scully say she increased their belief in the importance of STEM.
- A greater percentage of medium/heavy viewers of *The X-Files* strongly believe that young women should be encouraged to study STEM than non/light viewers (56% compared to 47%).
- Medium/heavy viewers are significantly more likely to strongly agree with the statement "I would encourage my daughter/granddaughter to enter a STEM field" than non/light viewers (53% compared to 41%).
- Medium/heavy viewers are more likely to strongly agree with the statement, "If I could go back and do it again, I would have studied or worked in an industry that is STEM" than non/light viewers (27% compared to 17%).

WORKING IN STEM: SCULLY INSPIRES SCIENTISTS

Women who regularly watch *The X-Files* are more likely to express interest in STEM, major in a STEM field in college, and work in a STEM profession than other women in the sample.

- Among women who are familiar with Scully's character, half (50%) say Scully increased their interest in STEM.
- Medium/heavy viewers are 43% more likely than other women to have considered working in a STEM field than non/light viewers (40% compared to 28%).
- Medium/heavy viewers are 27% more likely to have studied STEM than non/light viewers (28% compared to 22%).
- Medium/heavy viewers are 50% more likely to have worked in a STEM field than non/light viewers (24% compared to 16%).

Role Model: Scully Seen as Smart and Strong

Most of the women in the sample consider Dana Scully to be a role model for girls and women, and women who work in STEM are particularly likely to see her this way.

- Among women who are familiar with Scully's character, 91% say she is a role model for girls and women.
- Nearly two-thirds (63%) of women that work in STEM say Dana Scully served as their role model.
- Among women who are familiar with Scully's character, 63% say Scully increased their confidence that they could excel in a male-dominated profession.
- Nine out of 10 (91%) women who are familiar with Scully's ·racter say she stands out as being a strong female ·acter on television.

- Women in the sample were asked about various attributes of Scully's The most frequently used words to describe her were "smart," "intelligent," and "strong" (see word cloud below).

Figure 1: Words Used to Describe Dana Scully

Conclusion

We measured the "Scully Effect" in three different ways: ❶ influence on attitudes toward STEM, ❷ influence on STEM behaviors (studying and/or working in a STEM field), and ❸ views on Dana Scully as a role model. We found statistically significant outcomes for each that confirm the "Scully Effect."

When it comes to attitudes toward STEM, regular viewers of *The X-Files* have far more positive beliefs about STEM than other women in the sample. Moderate/heavy viewers place a higher priority on encouraging girls and women to go into STEM than non/light viewers, and nearly two-thirds of regular viewers say that Scully increased their belief in the importance of STEM.

Beyond attitudes toward STEM, the "Scully Effect" is also found in behaviors relating to STEM. Women who regularly watch *The X-Files* are significantly more likely to have considered going into a STEM career, majored in a STEM field in college, and worked in a STEM profession. Among women who are familiar with Scully's character, half of them say Scully increased their interest in STEM.

A vast majority of women who are familiar with Scully's character on *The X-Files* say she is a role model for girls and women, and nearly two-thirds of women who work in STEM say that Scully served as their personal role model. When asked about the impact of Scully's character, most women in the sample agree that Scully is a strong, smart, and intelligent character who increased their confidence to excel in a male-dominated profession.

The findings of this study confirm what previous research has established, that entertainment media is influential in shaping life choices. It is easy to dismiss entertainment media as simply entertaining, but half a century of social science research reveals that characters, images, and storylines in media shape our everyday lives in profound ways.12 They provide subtle and not-so-

subtle cues about what we should prioritize in our lives, how we should spend our time, how we should spend our income, who we should love, how we should love, how to overcome hardships, etc. In the case of the "Scully Effect," entertainment media influences what career options girls and women can envision for themselves. In Gillian Anderson's own words, Scully's character "manifested a woman not yet depicted on TV, and as the fan response soon proved, a desperately needed role model for women of all ages, everywhere."

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11. The use of conventional random sampling was not an option for this study given that only about 1% of women in the S. work in a STEM profession, and about 3% of women in the U.S. watch *The X-Files*. The size of the random sample required to draw accurate conclusions about these two subpopulations would have been time and cost prohibitive. Thankfully, oversampling is a valid and reliable way of getting more accurate results by reducing the margin of error for smaller subpopulations. (The margin of error decreases as the sample size increases, so oversampling a subpopulation reduces sampling error and allows us to more accurately determine if differences pertaining to the group are statistically significant.) We deliberately included more women in STEM professions and viewers of *The X-Files* in the sample to get a statistically significant survey for that group, then we weighted down to ensure that the oversampling of each group did not skew the findings.
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