

How *The Sex Lives of College Girls* May Shape Perceptions on the Culture of Mathematics

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Abstract

Popular culture may shape how society perceives the culture of mathematics. This, in turn, may impact participation in mathematics. *The Sex Lives of College Girls* is a comedy-drama series consisting of approximately 30-minute episodes. It won a 2023 Seal of Female Empowerment in Entertainment award but the rich representations related to mathematically talented characters are not so empowering. We analyze the mathematical representations in the first two seasons using textual analysis and a popular culture framework as we discuss the sociocultural messaging.

Popular Culture and How It May Shape Perceptions on the Culture of Mathematics

Sociocultural identity is an individual's sense of self and how they view their place or role in a particular culture or social group. Haran et al. discuss the importance of popular culture as it may relate to shaping perceptions about the culture of mathematics in "helping to define people's sense of taken-for-granted normality as well as sometimes facilitating social change" [8]. Furthermore, mathematics educators and others have also considered the part that media characters might play in shaping perceptions of mathematics among students: "Socioculturally available identities can be operationalized through reference, mention, and discussion of widespread beliefs about mathematics and mathematicians that are many times enacted and performed through characters in movies and popular media" [2].

Some of the traits or identities that Fellus mentions include mathematicians being imperturbable as well as mathematics being gender-specific [2]. In the case of many male mathematically talented characters in popular culture, we are shown that they are obviously comfortable with who they are, even when others are making fun of them. Additionally, mathematics and the mathematically talented often bear the brunt of negativity in popular culture—"everybody hates mathematics" is a well-known trope. There is a long history of people making fun of mathematically talented nerds, geniuses, and mad mathematician types in popular culture. Some well-known examples of this include the character of Urkel from *Family Matters*, Sheldon and several other main characters from *The Big Bang Theory*, and Sheldon's younger incarnation from *Young Sheldon*. These shows are all half-hour sitcoms, and they often make fun of the characters in the context of the show with the intent of playing mathematical stereotypes for easy laughs, assuming that the audience will be in on the joke and laugh along. One well-known example of a gender-specific identity is from the 2004 movie *Mean Girls*, involving Cady Heron, the lead character. As mathematician Christopher Goff notes, "she pretends to be bad at math, even purposely failing Calculus tests... She decides that concealing her talent presents the quickest road to a relationship with the boy of her dreams" [4].

The research has continually reinforced how "sociocultural and historical scripted roles dictate and reproduce what one can be, do, or say mathematically" [2]. In addition to individuals, professional associations like the Association for Women in Mathematics (AWM) have conveyed the importance of analyzing such portrayals in artistic and creative endeavors and the messages they may communicate to students about gender and mathematics. Some such analyses can be found in the *AWM Newsletter* media column.

In the current landscape of popular culture, a newer show that we have not seen explored in terms of mathematical identities is *The Sex Lives of College Girls*. We chose this show because it has good viewership numbers and has some rich representations related to mathematically talented characters. The show won a 2023 Seal of Female Empowerment in Entertainment award. In announcing the award, the Critics Choice Association says [1]:

With diverse female representation behind and in front of the camera, *The Sex Lives of College Girls* is the perfect example of what we are looking for when awarding... Women write and produce the series, and their point of view shines through.... The show's sex positive message is reflected differently for each of the four main characters, allowing women from all walks of life to see elements of their own journeys represented on-screen

However, overall in the series, the mathematical representations are not so empowering.

In the following sections, we analyze mathematical portrayals in the series. We restrict our analysis to Seasons 1 and 2, as they were what were available at the time of writing. One of our primary methods is textual analysis, which is a qualitative method used to scrutinize shows and other media. Textual analysis can be defined in several ways. As is common in some media studies contexts, we interpret it broadly as an analysis of the visuals, dialogue, tone of voice, interactions, and more in the show. To analyze the show, we first watched all available episodes to try and find any indication of mathematical content. Then we searched transcripts and rewatched the relevant portions. In this paper, we include textual analysis of all the scenes we found related to mathematics. In addition to textual analysis, we discuss sociocultural implications, describe a framework of popular culture indicators, apply this framework, and conclude with broader implications.

Textual Analysis of Mathematical Representations in Seasons 1 and 2 of *The Sex Lives of College Girls*

The Sex Lives of College Girls is a scripted show centered around four college roommates: Bela, Kimberly, Leighton, and Whitney. Leighton is a mathematically gifted and brash college student who is quite concerned with popularity. We are first introduced to Leighton's mathematical talent in Season 1 Episode 2. It is day one of Leighton's mathematics class, in a large lecture hall, and they are going to start off with a quick assessment test. Later on, the professor lets her know how well she has done. Leighton seems surprised that she got the highest score in the class and tells the professor: "I would have thought that everyone would have done well—it was so stupid and easy." The professor tells her that she needs to be in a much higher level class. Plus, he says that he wants to increase the number of women in his seminar—to one! She agrees to move up to the advanced seminar, but only if the professor sings her praises to the class, as she is trying to show up some girls that dissed her in the prior episode.

In that same episode, there is a scene related to Leighton's sexuality, another plotline in the show, that we feel also provides insight into her feelings about mathematics. When asked why she is hiding her sexuality, Leighton responds: "For someone like you, I'm sure coming out probably made you more interesting, but for me I was popular so I actually had something to lose... I don't want to be other... I just want to be me." In later episodes, Leighton often hides her mathematical talent when she is concerned about it impacting her popularity, "masking her math whiz tendencies from the public eye whenever possible" [9]. Reneé Rapp, the actress who portrays Leighton, said: "I love the hot girl who happens to be good at math. That trope is hilarious to me... I enjoy her being very book smart because I think it also makes people look at her in a different way, which is annoying, but also just life" [13]. Rapp may be acknowledging the perceived conflict of math with the character's gender and sexuality, which is what these examples point to.

Not only does Leighton hide her mathematical talent, on occasion she makes outright derogatory statements toward mathematics and mathematically talented people. Like the prior sitcoms we mentioned,

The Sex Lives of College Girls is also an approximately 30-minute show. It is described as a comedy-drama. While the humor is often less broad and repetitive than in the other examples, the show still seems to use these stereotypes as a way to generate laughs. In addition to helping quickly generate laughs, we think that some instances of mathematical stereotypes in the show are instead intended to help viewers identify with Leighton, but at the expense of mathematics. For instance, in Season 1 Episode 4, in a one-on-one conversation at the sorority house, one of the sisters makes a brief mention about Leighton possibly majoring in math. Leighton seems to be surprised that the sorority sister knows this and she quickly interjects as a response: "I know it's lame."

Season 2, Episode 5 provides special insight into Leighton's conflicting love-hate feelings about mathematics, the mathematically talented, and her own role within mathematics. Walking out of a building, Leighton pretends to not know two of the eight people in her twice a week advanced math seminar. The two characters, Jimin and Maurice, have approached her after class to invite her to a mathematics department "hackathon," an extracurricular event where people with different levels of expertise engage in collaborative work to solve problems in a short period of time. She turns them down flat and calls it a "depressing event." Undeterred by her attitude, they invite her to watch the event's livestream online. However, she pretends not to hear them, not only once, but twice!

Despite her earlier protests, Leighton does watch the livestream. In a scene in a car, Leighton tells her roommate Kimberly she is watching a "dumb math hackathon" not for fun, but just so her teacher knows she is. She asserts that she isn't paying attention, but she clearly is when she yells at the screen: "oh come on Jimin, how do you mess up a problem like that?" Later, we see her continuing to watch from her room. Again, she yells at her phone screen: "Jimin, how do you mess up a simple differential equation." Her roommate suggests that it seems like Leighton would like to be there with them, but Leighton replies that she has no interest in being there with the nerds. Kimberly replies, "But I think you might be a nerd." Leighton is not happy with that classification but responds very quickly with an answer when her roommate asks her to divide 715 by 62. Leighton pontificates, "I don't take math classes because I'm some loser that loves numbers. I do because I'm really good at it. I enjoy being better at things than everyone else."

With additional encouragement from her roommate, Leighton decides to attend, but asks her roommate to tell people she is at a far more socially desirable event: a yacht party. After the hackathon, while her team is walking out together, Jimin declares that they never would have achieved their second-place standing without Leighton. In addition, Maurice enthusiastically announces "we'll get first next time." Leighton quickly dismisses them, explaining that if she does decide to participate in the future, then she'll join up with the first-place team instead.

We see gender differences in the comfort level of the characters when others dismiss them. Jimin and Maurice are unconcerned when Leighton ignores them or is disparaging. However, in the case of Leighton, we experience more of the duality that she feels. Shortly after the scene above where she tries to brush off her teammates, we see something of a reverse perspective in which she gets an inkling of getting treated in the same dismissive way that she has been treating the guys. Another female student, who Leighton seems to perceive as being more like her, honks her car horn at the group of three to get them to move so she can park. After exiting her car, she ignores Leighton's attempt to connect with her. Instead, she dismisses Leighton with a sarcastic comment and walks away. Leighton is stunned by this treatment.

One instance in which *The Sex Lives of College Girls* is less negative about mathematics is when they show it as useful. In Season 2 Episode 6, Leighton's roommate Whitney is portrayed as capable when she catches a math error that her overbearing lab partner had made when trying to do everything himself. They were measuring the rate of carbon dioxide production by yeast, and if she had not caught the mistake, the lab would have been ruined. However, while Leighton and Whitney are portrayed as being mathematically talented, the other two roommates, Bela and Kimberly, are not shown as being good at math. For instance, in Season 2 Episode 9, Bela says "God, I'm bad at math" in a brief mention that is played for humor.

In fact, there's only one scene we can think of where there is definite positivity about math in the show. Earlier in Season 2 Episode 6, Leighton is talking with her roommates and asserts "math is objectively cooler than biochem" when her roommate Whitney talks about how much she enjoys her biochemistry lab. In the context of this group, where the others clearly accept her mathematics skills as a part of who she is, Leighton feels more free to demonstrate how much she enjoys mathematics.

While most scenes involving math take place with college friends and professors, in Season 2 Episode 8, Leighton is having dinner with her father, her girlfriend, and her girlfriend's father, who is also her father's old college friend that he clearly feels the need to impress. Notably, she hasn't yet told her father that she is a lesbian. When Leighton wants to leave the dinner to work on her math homework, her father's friend makes a comment about how her father has raised a "real nerd." Leighton's father immediately joins in, pointing at her and saying: "nerd alert!" In front of his own "cool guy" friend, the dad immediately jumps in on the nerd talk. Later in the meal, Leighton comes out to her father about her sexuality. When they speak alone about her revelation after the others are gone, he's more open and proud of her for claiming her own sexuality. We find it sad that he never says anything positive about her mathematical talent.

Analysis Using Popular Culture Framework and Indicators

We feel that students need to see people who are like them doing mathematics in the same ways they do. One avenue for this is in popular media that depicts characters who are engaged in mathematics. In [6], we discussed indicators designed to assess popular culture representations of mathematically talented characters. We included indicators from [3] and [10] and added some items we felt were important but not represented in either of these sources. We then applied the framework to analyze a character in a popular show of the time. Here we summarize the previous indicators and then further add to this framework as we analyze the portrayal of Leighton in *The Sex Lives of College Girls*.

Steinke, a researcher in communication who focuses on STEM representations, analyzed popular culture portrayals of women in STEM using a framework of five indicators: early encouragement in science, professional status, professional reputation, professional relationships, and the impact of personal relationships on professional goals [10]. With regard to early encouragement in science in *The Sex Lives of College Girls*, we have watched the entire series to date and there is no indication of any encouragement for Leighton before college. The messaging surrounding Leighton's professional status and professional reputation are both positive in the show, because of her talent and also the way her mathematics professor and fellow classmates Jimin and Maurice treat her. Conversely, her professional relationships are quite negative because of the way she treats Jimin and Maurice. When Leighton is concerned with popularity, her personal relationships impact her professional goals negatively—she hides her talent and it also negatively impacts her participation. With her closest friends, such as the roommate who encourages her to attend the math hackathon, we see some positive influence of personal relationships. So we feel the impact of Leighton's personal relationships on professional goals is mixed overall.

Mathematics educators Fennema and Sherman designed an assessment scale with several indicators to measure student attitudes toward the learning of mathematics [3]. In this usage, students would mark their own answers. While Fennema and Sherman did not design the scale to assess fictional characters, it can work well in such a context. We previously applied Fennema and Sherman's indicators to a popular culture representation [6]. In this sense, we are treating the fictional character as we would a real-life student. We try to respond as they might, given our analysis of the show. The eight indicators are: attitude toward success in mathematics, mathematics as a gender-neutral domain, parental support, teacher support, confidence in learning mathematics, mathematics anxiety, motivation for challenge in mathematics, and mathematics usefulness. With the exception of the indicator on mathematics usefulness, we apply these as they relate to Leighton. With regard to attitude toward success in mathematics, Leighton feels that she is "really good at"

mathematics. From this and other scenes, we feel the show portrays Leighton's attitude toward success as positive. However, the show does not portray mathematics as a gender-neutral domain. The show normalizes male participation in mathematics while positioning Leighton's gender as unusual when her teacher tells her that he wants to add her to the advanced seminar so that there will be one woman in there. We also think that the way that Jimin and Maurice are so comfortable about admitting their participation to others while Leighton is often so uncomfortable about that is another way that the show sends messaging about a lack of gender neutrality. The scene where Leighton's father makes fun of her interest in mathematics with a "nerd alert" shows a lack of parental support. This scene is the only one where she brings up mathematics with a parent. Even though Leighton's teacher has ulterior motives, he does support her by encouraging her to join the seminar and Leighton later mentions wanting her teacher to know that she was watching the hackathon, so we feel that teacher support is positive overall. Leighton is confident about learning mathematics and shows no anxiety about the mathematics itself, only about admitting her talent to others. We are provided with insight about why Leighton is motivated for challenge in mathematics—because she likes "being better at things than everyone else." The scene with Whitney briefly showcases mathematics as applicable to real life to measure the rate of carbon dioxide production by yeast. Even though this is not a scene with Leighton in it, we still would rate the series as showing that mathematics is useful because of it.

When we previously analyzed mathematically talented characters in popular culture, we added two indicators that we deemed to be missing from the other measures we used from the existing literature: students identify with the character and students identify with the way the character does mathematics. In considering the complex portrayals in *The Sex Lives of College Girls*, we have added three additional indicators to this paper about the sociocultural messaging: whether there are derogatory statements toward mathematics, how others treat people who are mathematically talented, and whether mathematics is an acceptable major and career. In our judgment, students likely do identify with Leighton as a character. We feel as if the show is written so that people will identify with all four lead characters. We are participants in many ways on their journey through college. However, we do not feel that students can necessarily identify with the way Leighton does mathematics as it has been portrayed thus far. Leighton deems the mathematics assessment test as easy. We get to observe her quick, off-the-cuff computation for her roommate. There is one scene where Leighton mentions the need to work on mathematics homework. However, we as viewers do not get to see the process of her engaging with homework or tests, or how she interacted and contributed during the math hackathon. In this way, mathematics in the show is stereotypically portrayed as innate, something that mathematically talented people can just do, rather than something they may have to work at. The way that Whitney is shown using mathematics while working in the lab seems much more identifiable to us. As evidenced in the prior section, the show includes derogatory statements toward mathematics, such as the characterization of a person taking advanced mathematics classes as being "some loser that loves numbers." In addition, the mathematically talented are treated negatively overall—especially by Leighton. For example, Leighton repeatedly mocks Jimin and Maurice. In addition, Leighton's father makes fun of her once he hears his friend doing so, rather than supporting her. In terms of whether mathematics is an acceptable major and career, there is an instance where we see Leighton anticipating a negative response from a sorority sister (which she does not receive) when she admits that she is thinking about majoring in mathematics: "I know it's lame." We do have the one scene with the mathematics professor who at least somewhat encourages Leighton. There are some scenes where Leighton seems happy or proud to be in mathematics but there are many others where she is conflicted about her participation. Overall, there are mixed messages about whether mathematics is an acceptable major and career.

We have summarized the results of our analysis in Table 1, mostly as they apply to Leighton, although we do include the portrayal of the usefulness of mathematics as it applied to Whitney. Even though there is no direct evidence of Leighton feeling or conveying that mathematics is useful, overall, the show does send this message. For most of the indicators we used a rating scale of "none indicated," "negative," "mixed," or

“positive.” For a few where the rating scale was not conceptually appropriate, we used a binary “no” or “yes” (see Table 1). Of the eighteen indicators, there are nine indicators that send encouraging messages (we count

Table 1: *Popular Culture Indicators Applied to Leighton and ‘The Sex Lives of College Girls.’*

Indicator	Our Assessment of Messaging
Steinke Framework Indicators	
early encouragement in science	none indicated
professional status	positive
professional reputation	positive
professional relationships	negative
impact of personal relationships on professional goals	mixed
Fennema-Sherman Framework Indicators	
attitude toward success in mathematics	positive
mathematics as a gender-neutral domain	negative
parental support	negative
teacher support	positive
confidence in learning mathematics	positive
mathematics anxiety	none indicated
motivation for challenge in mathematics	positive
mathematics usefulness	yes [Whitney]
Our Indicators	
students identify with Leighton	yes
students identify with the way Leighton does mathematics	no
derogatory statements toward mathematics	yes
treatment of the mathematically talented	negative
mathematics is an acceptable major and career	mixed

the lack of messaging for mathematics anxiety as positive), six indicators that send discouraging messages (we count the presence of derogatory statements toward mathematics as discouraging), two indicators that send mixed messages, and the one indicator, early encouragement in science, is not indicated in the show. This framework as represented in tables like Table 1 can be used to compare and contrast representations in popular culture.

Broader Implications

We don’t agree with some of the positive press surrounding mathematics and the show like from the journalist Hajimirsadeghi who says “Leighton’s doing her mathematics and reversing the norms of what girls should major in” [7]. Viewers’ perceptions of media often vary, so we would very much be interested in knowing how women mathematicians and mathematics students who have watched the show feel about this quote. For some people, simply seeing a mathematically talented character in a show may be very empowering, especially because Leighton clearly feels like she belongs in the mathematical spaces in the show (even though she worries about others’ perceptions of her). For us, the representations in the series come with so much negativity in the way that Leighton treats others and in the way her father treats her with regard to mathematics, that we are not sure it is reversing any norms. The show has been renewed so perhaps there will be further development next season, although the character of Leighton will reportedly be leaving after a few episodes.

Why do we care about this as mathematicians? An abundance of research has shown that “there are

major issues around training, recruitment, retention, and promotion for women in science, engineering, and technology... The mass media may have a crucial role in either reinforcing, or challenging such gender segregation and inequalities.” [8]. Even though this quote is from research that is based in the UK, there are similar problems in the US where we work. We created Figure 1 from the most recent data available at [12] and rounded all values to the nearest whole percentage. We chose to start with 1970 because it represents approximately fifty years of annual data with no missing years. The curve on Figure 1 was fitted to the data using LOESS (locally weighted smoothing). It is a widely used method in regression analysis that creates a smooth curve through a time series plot to visualize relationships and trends. LOESS is similar to a moving average. The curve at any given year is smoothed by using information from data in adjacent years. We and others are concerned about the fact that these data show women were awarded only about 42% of the US undergraduate degrees in mathematics and statistics in roughly the last five years. We are concerned for two reasons: women form a majority of undergraduates (more than 58%) in the US [11] in the most recent year that data is available, so 42% is much lower than that percentage, and also the 42% share is down from the overall high of about 48%. This is highlighted in Figure 1. In the same figure, we see that there was an increasing trend in the percentage of undergraduate degrees in mathematics and statistics earned by women from 1970 through the late 1990s, with the maximum percentage occurring between 1998 and 2001. Then the trend reversed, and the percentage of such degrees earned by women has been decreasing. This

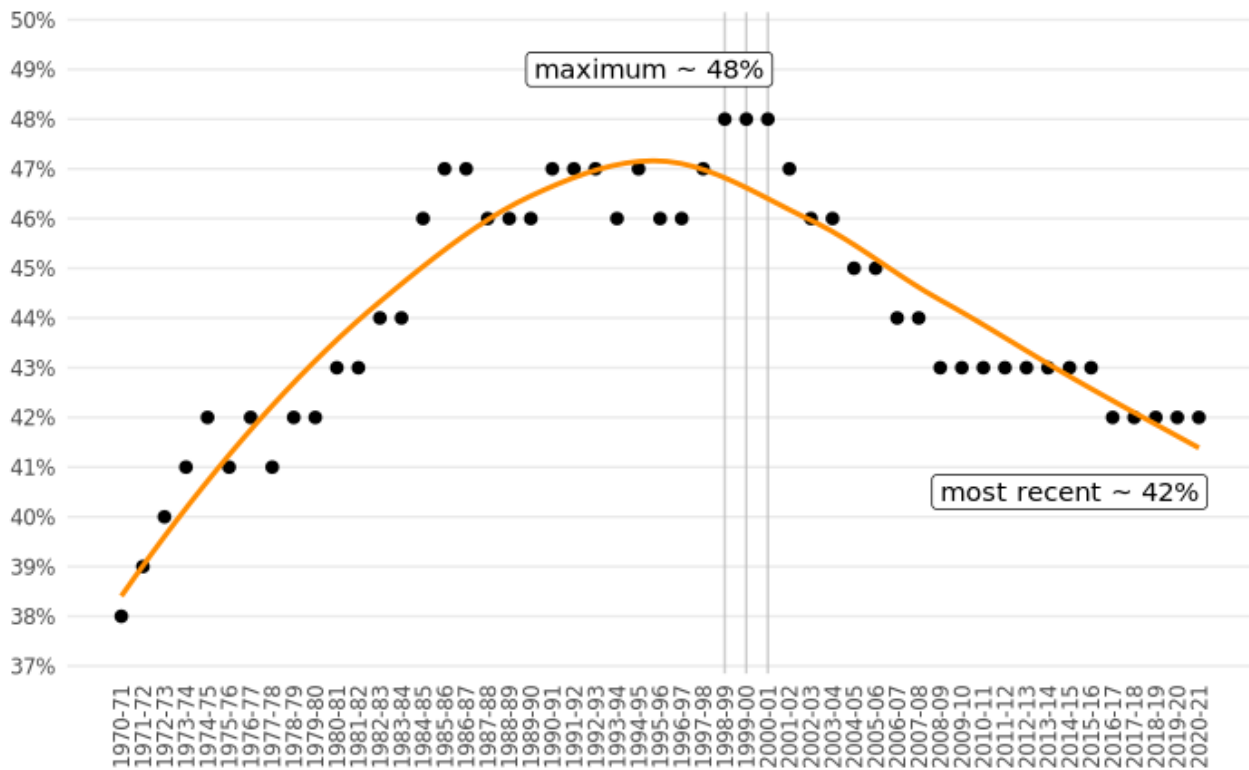


Figure 1: Rise and fall of US undergraduate degrees in mathematics and statistics awarded to women.

visualization shows that there is a great need for us to intervene, especially because the percentage of women college students has gone up over time.

Overall, compared to prior times, we find that mathematically talented characters are more diverse than they used to be but problematic stereotypes persist. We would like to see portrayals of mathematically talented people in popular culture that support the true range of current and future possibilities without such negative connotations attached to them, but we don't feel that the responsibility falls to fictional shows. The goal of

fictional shows is first and foremost to entertain an audience. Writers often stray from reality in that endeavor, and sometimes they rely on tropes and stereotypes that audiences are familiar with. In our view, while it is not the job of writers, producers, or others in the entertainment industry to be mindful of messaging about our profession, in our roles as educators, we should be aware of the sociocultural messaging in popular culture and take steps to counter negative aspects. We can include real-life role models in the classroom, such as in [5]. And we can encourage our students to show them that mathematics is a place they belong.

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