

*USING RESEARCH FINDINGS
ON INTEREST GENERATION
TO HELP US PROVIDE
EQUAL ACCESS TO QUALITY
STEM EXPERIENCES*

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STEM Smart Workshop – Baltimore, MD

WHO IS IN THE AUDIENCE?

- 1) Informal Educators
- 2) Elementary School Educators
- 3) Middle School Educators
- 4) High School Educators
- 5) School Administrators
- 6) University STEM Educators
- 7) University Education Faculty
- 8) Others

WHAT IS YOUR
PRIMARY WORK ZIP
CODE?

WHAT IS YOUR MAIN GOAL?

- 1) To increase advanced training and careers in STEM fields – expand the number of students who pursue advanced degrees and careers in STEM, including greater participation of underrepresented groups
- 2) To expand the STEM capable workforce, including greater participation of underrepresented groups
- 3) To increase scientific literacy among the general public

BACKGROUND

- Calls at all levels for increasing the numbers of students graduating college
 - Particular focus on earning degrees in STEM
- Estimates indicate that small changes in persistence/graduation rate can lead to sizable changes in overall numbers of graduates

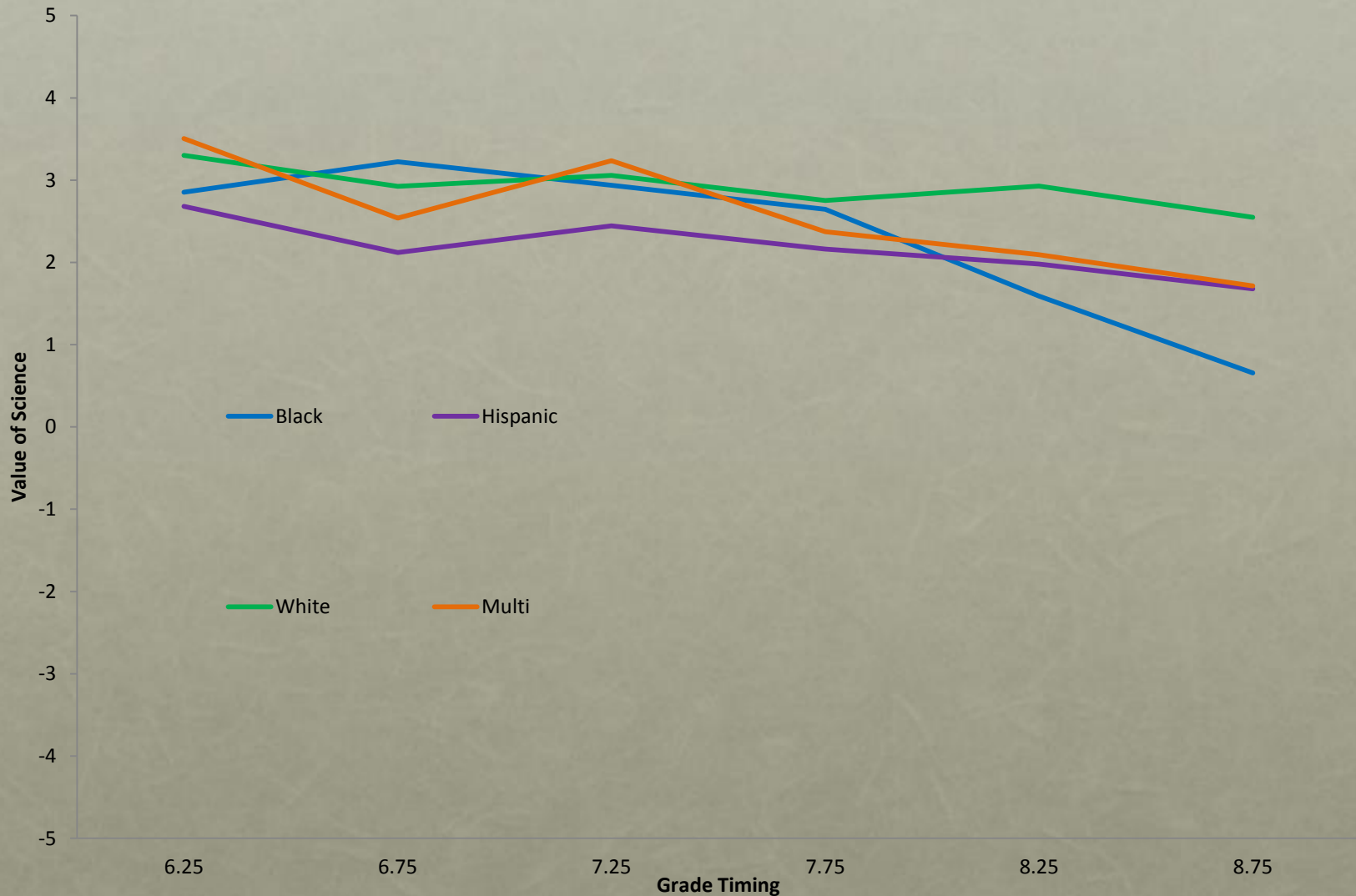
BACKGROUND

- Prior work suggests the importance of interest beyond performance
- Some evidence that changing trajectories of interest during high school lead some students to enter and some to leave pathways to STEM
- Evidence that students within the same class can have differential outcomes

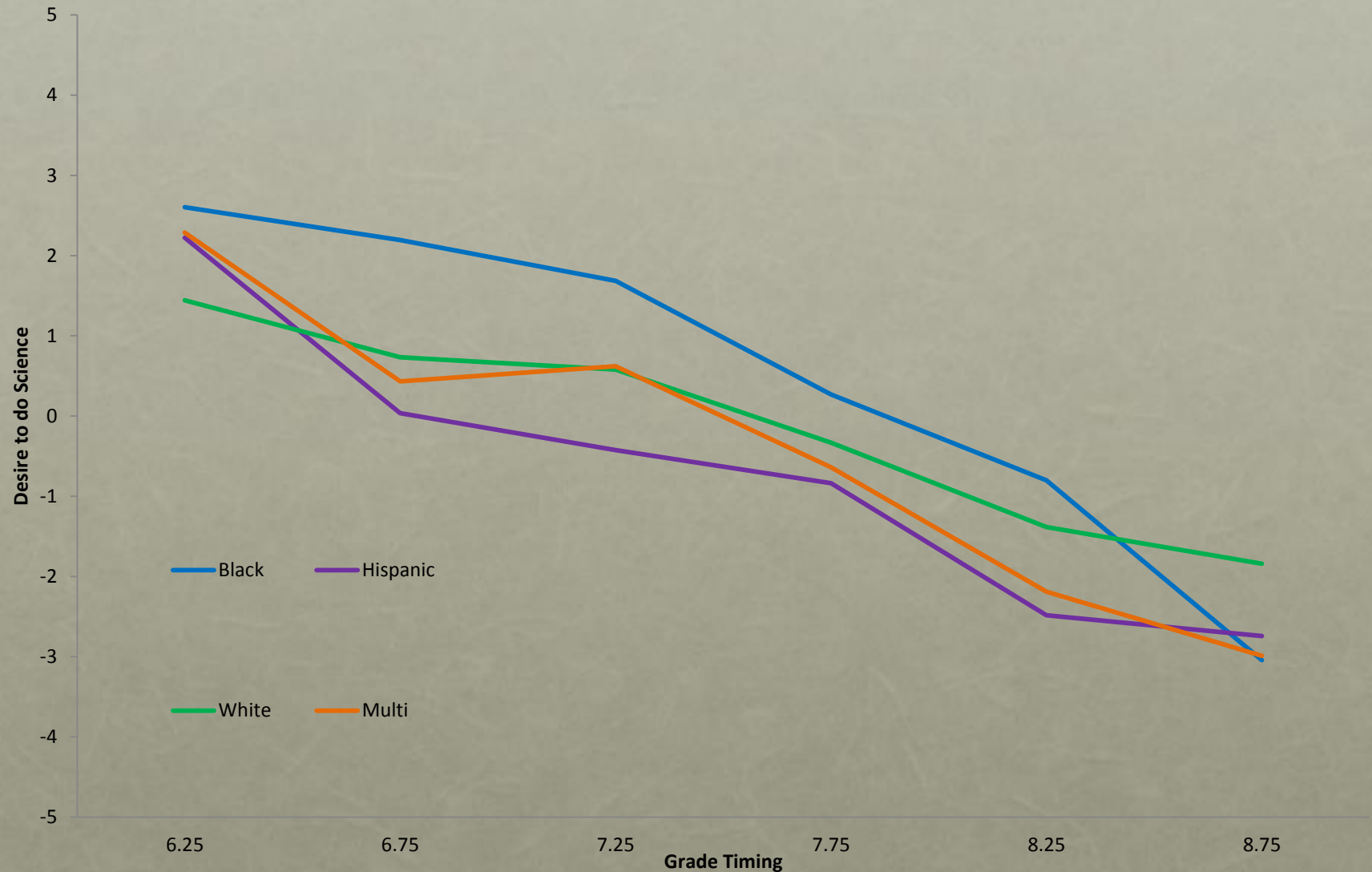
SOME DATA

- *After school Comparison Study (N~2200)*
 - National sample of 6th-8th grade students
 - Groups from urban, rural and suburban settings
 - Surveyed students at beginning and end of 2 consecutive school years
- *Early Interest – Scientific American Survey (N~7000)*
 - Sample of colleges and universities from across US
 - Focus on collecting data on initiation and maintenance of interest; includes comparison group

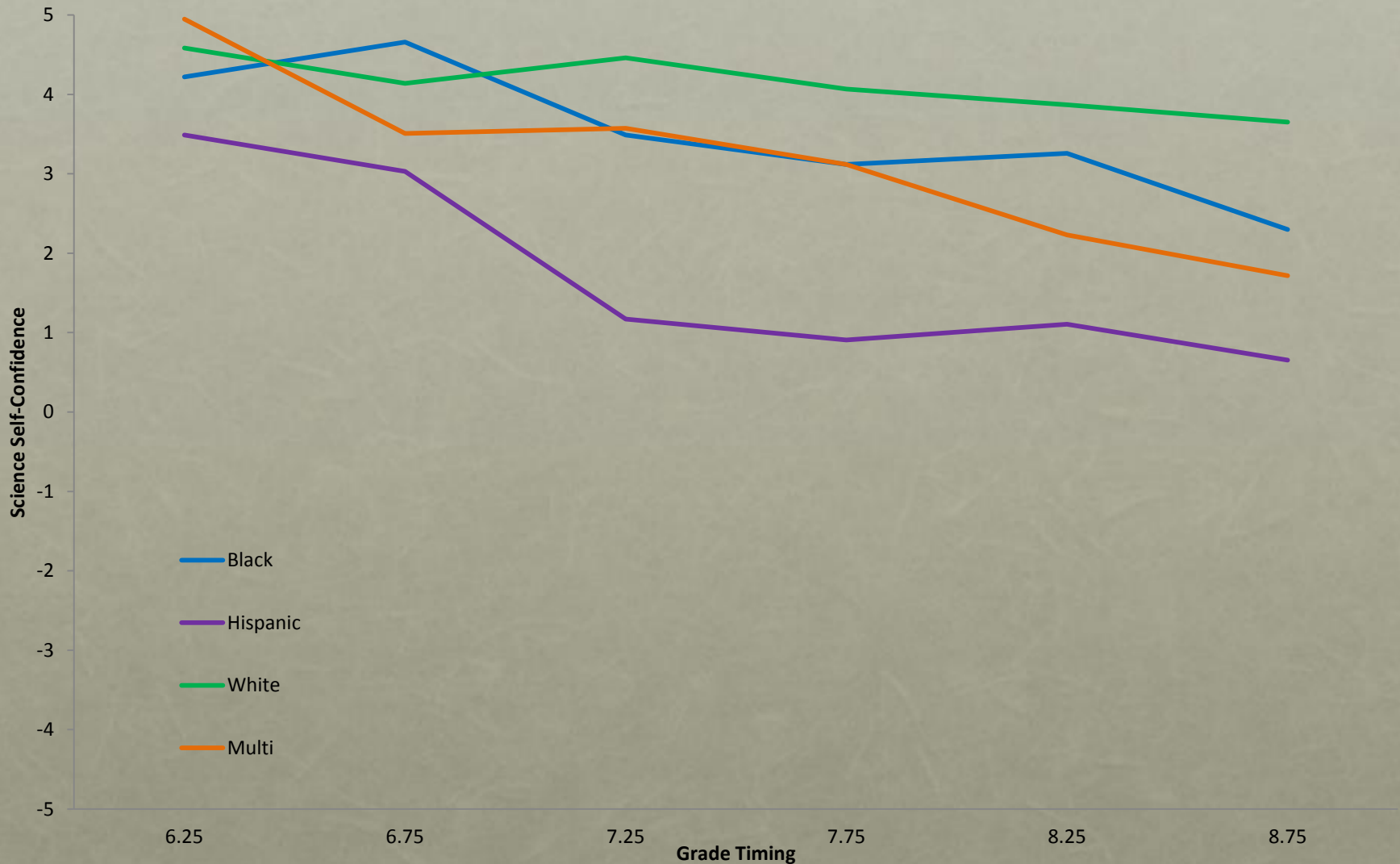
Value of Science



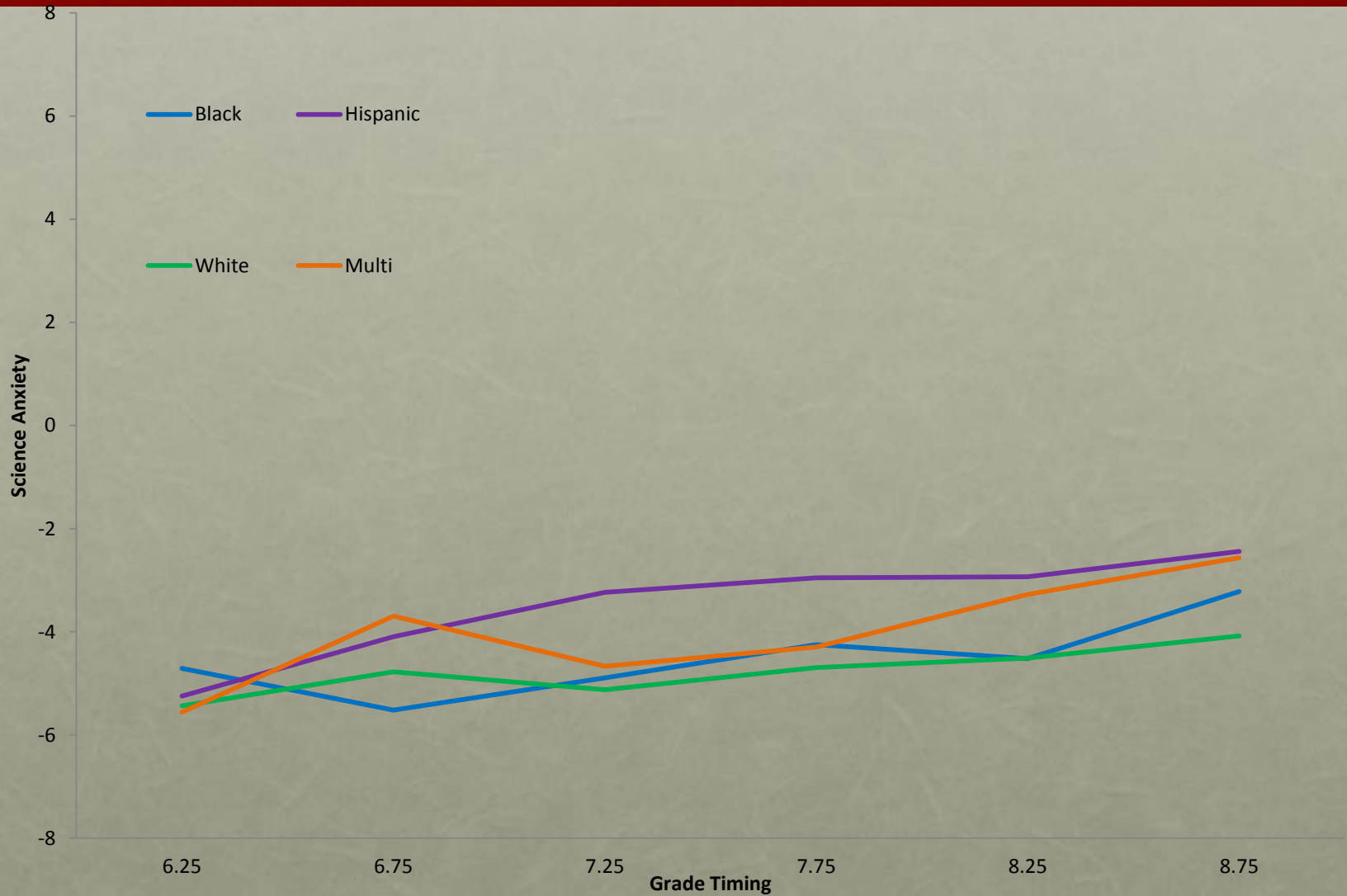
Desire to do Science



Science Self-confidence



Science Anxiety



Science Teacher



EARLY INTEREST

What type of experience first sparked your interest in STEM?

- 1. A visit to a museum, zoo, aquarium or nature reserve*
- 2. Books or magazines*
- 3. Building / Tinkering / Taking apart mechanical objects or electronics*
- 4. Class at school*
- 5. Interest in math problems / logic games*
- 6. No specific event - I remember ALWAYS being intrinsically interested*
- 7. Playing or spending time outdoors*
- 8. Science Club / Math Team*
- 9. Science Fair*
- 10. Television show or movie*

What do you think is the event most commonly reported by participants when asked:

What type of experience first sparked your interest in STEM?

1. *A visit to a museum, zoo, aquarium or nature reserve*
2. *Books or magazines*
3. *Building / Tinkering / Taking apart mechanical objects or electronics*
4. *Class at school*
5. *Interest in math problems / logic games*
6. *No specific event - I remember ALWAYS being intrinsically interested*
7. *Playing or spending time outdoors*
8. *Science Club / Math Team*
9. *Science Fair*
10. *Television show or movie*

Class at school	24.4%
No specific event - I remember ALWAYS being intrinsically interested	16.8%
Building / Tinkering / Taking apart mechanical objects or electronics	10.3%
Books or magazines	8.3%
Interest in math problems/logic games	8.2%
Playing or spending time outdoors	6.7%
A visit to a museum, zoo, aquarium or nature reserve	4.9%
Television show or movie	4.0%
Science Club / Math Team	2.3%
Science Fair	2.1%
Computer programming/building & Internet	1.6%

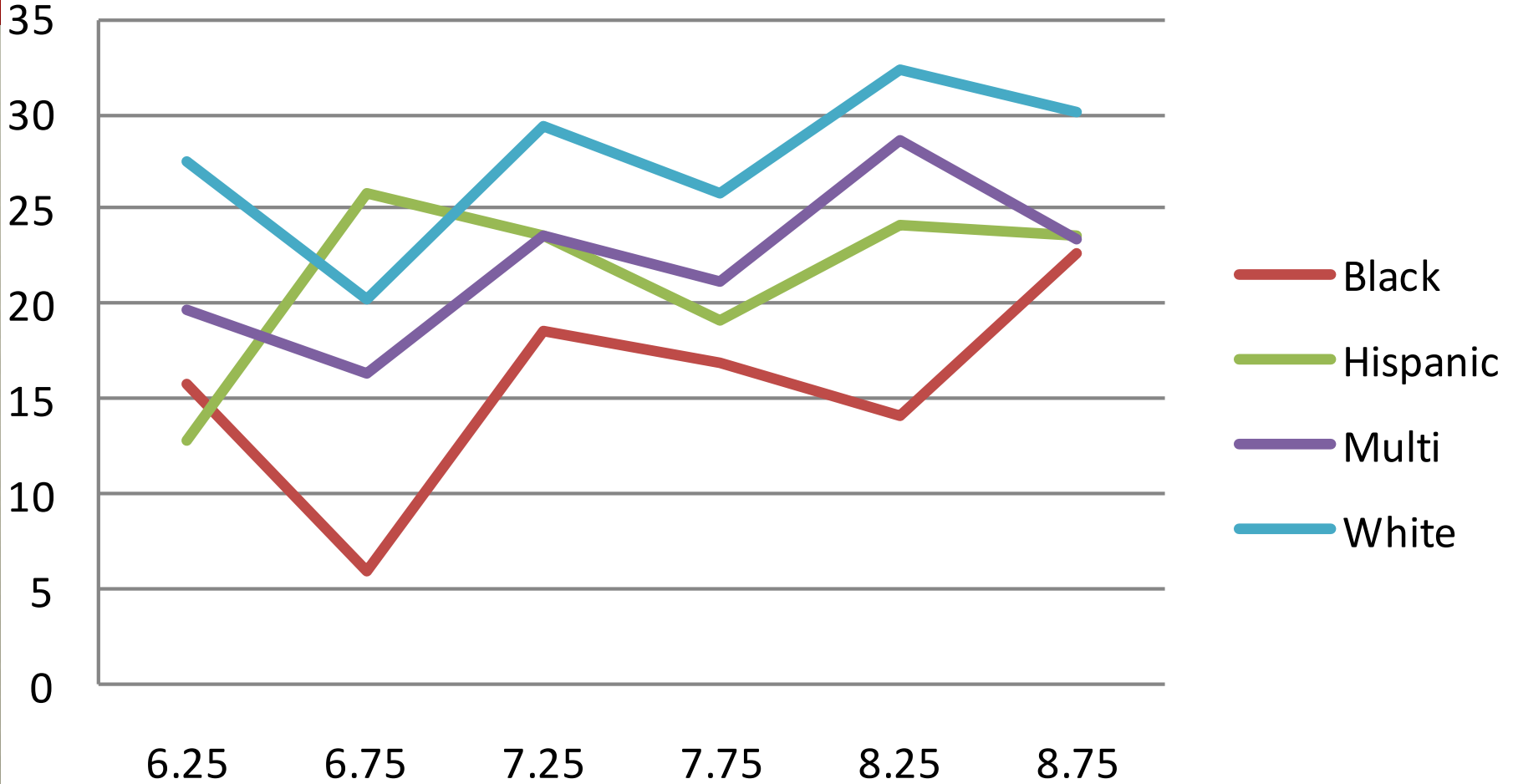
	Male	Female
Class at school	18.7%	30.2%
No specific event - I remember ALWAYS being intrinsically interested	16.6%	17.1%
Building / Tinkering / Taking apart mechanical objects or electronics	17.1%	3.4%
Books or magazines	10.2%	6.3%
Interest in math problems/logic games	7.6%	8.8%
Playing or spending time outdoors	5.4%	8.1%
A visit to a museum, zoo, aquarium or nature reserve	4.0%	6.0%
Television show or movie	4.6%	3.3%
Science Club / Math Team	2.2%	2.4%
Science Fair	1.8%	2.5%
Computer programming/building & Internet	2.3%	.9%

NOW THE HARD WORK

1. Think about how these results support or challenge notions you held for the generation and maintenance of STEM interest
2. Think about two explicit ways you can apply these results toward improving equitable access in your work context
3. Organize into groups based on Informal / Formal (ES/MS/HS/Coll)

CAREER INTEREST

Interest in STEM jobs



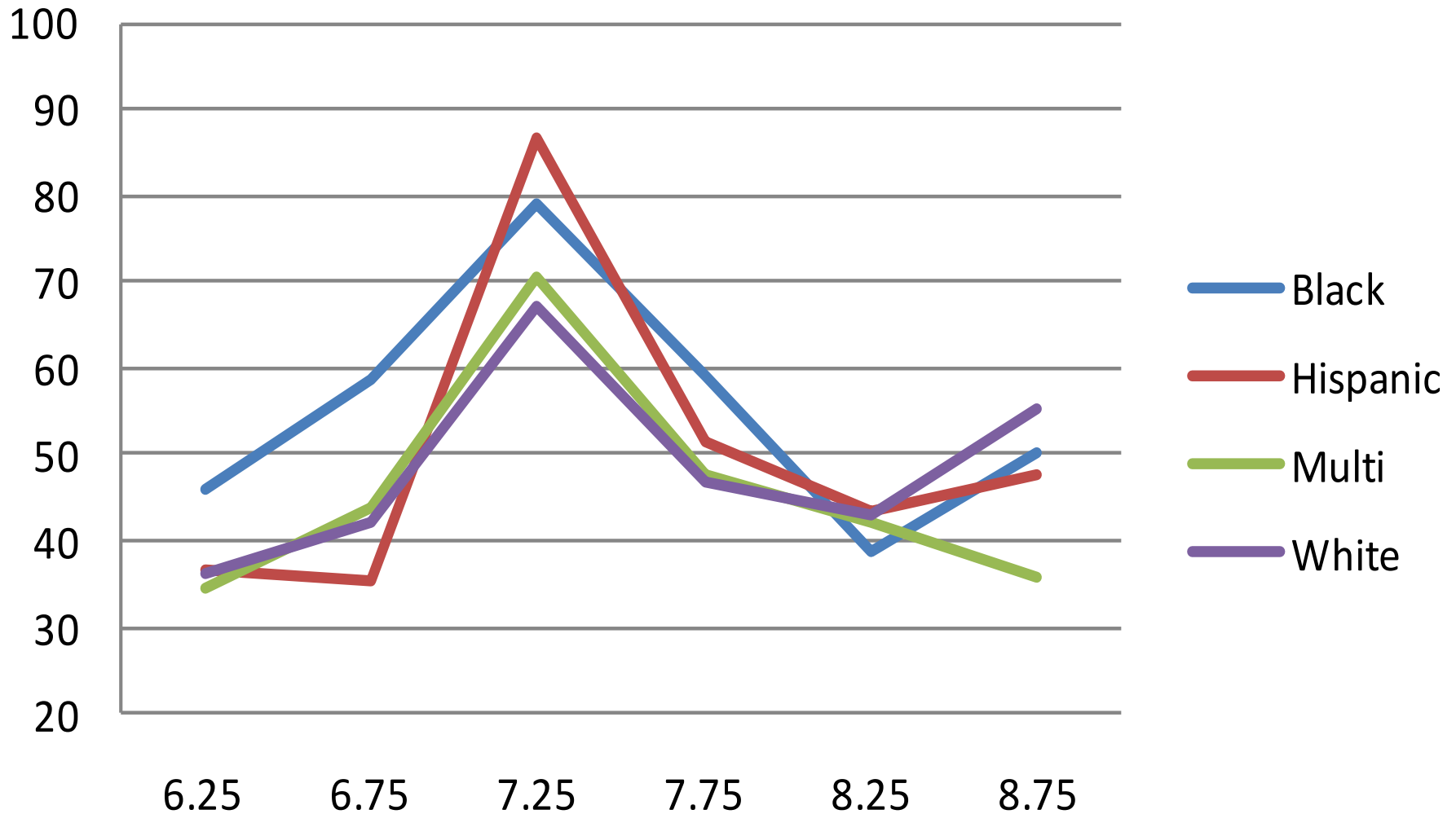
Black avg. n= 119

Hispanic avg. n= 160

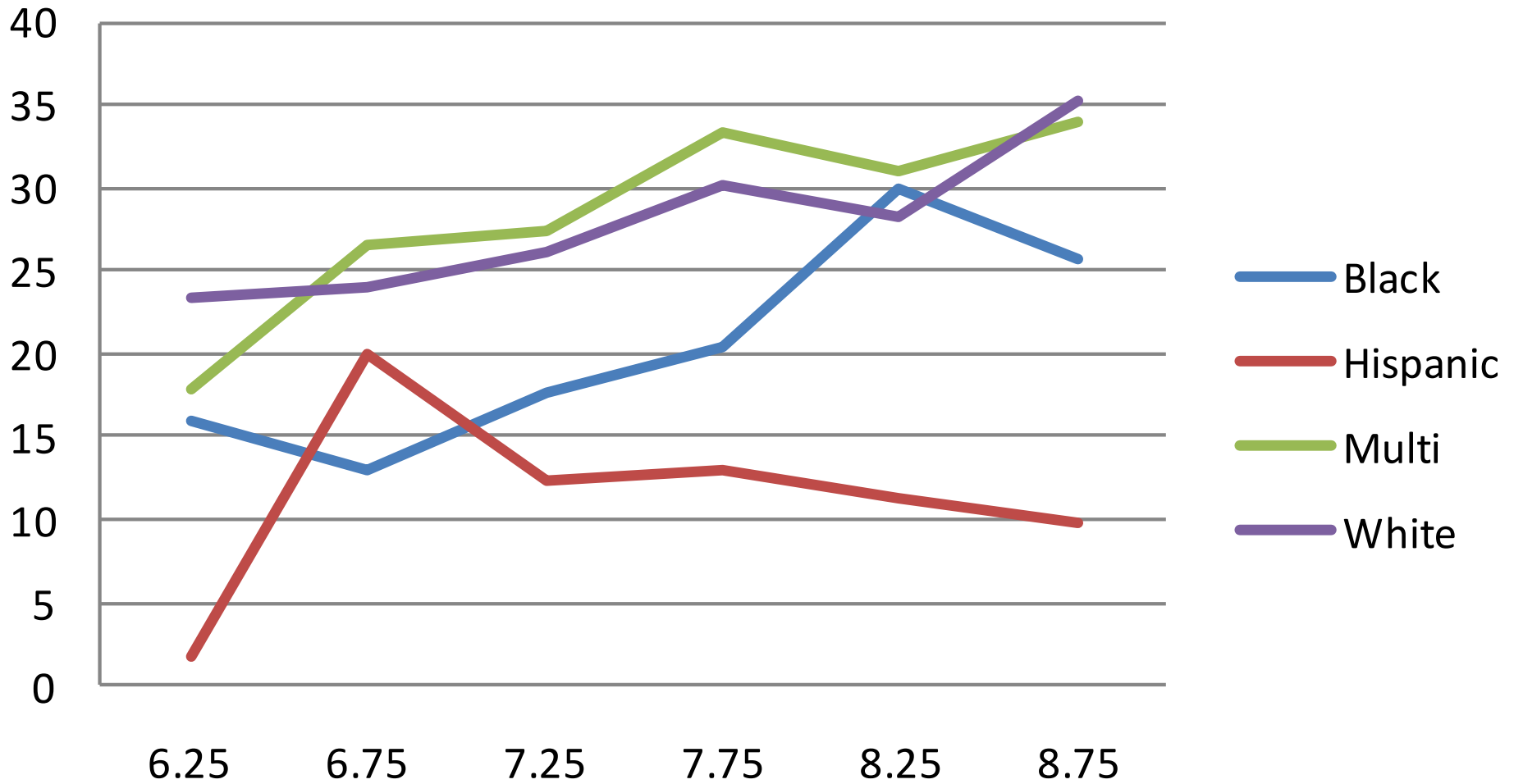
Multi avg. n= 116

White avg. n= 505

Teacher discuss careers in Science?



Do you know a scientist?



What do you think the top career choice is for **FEMALES**?

1. Arts, Communications, and Tourism (like chefs, artists, fashion designers, newscasters, travel agents)
2. Education and Counseling (like teachers, librarians, psychologists, social workers)
3. Entertainment & Sports
4. Finance (like bank tellers, economists, financial managers, insurance agents)
5. Government, Law, Security (like lawyers, police, inspectors, politicians, postal clerks, mail carriers)
6. Journalism (like reporters, television news announcers, news photographers)
7. Medicine & Veterinary Care
8. Military (like soldiers, sailors, Marines)
9. Science and Engineering (like scientists, engineers, computer programmers)

What do you think the top career choice is for **MALES?**

1. Arts, Communications, and Tourism (like chefs, artists, fashion designers, newscasters, travel agents)
2. Education and Counseling (like teachers, librarians, psychologists, social workers)
3. Entertainment & Sports
4. Finance (like bank tellers, economists, financial managers, insurance agents)
5. Government, Law, Security (like lawyers, police, inspectors, politicians, postal clerks, mail carriers)
6. Journalism (like reporters, television news announcers, news photographers)
7. Medicine & Veterinary Care
8. Military (like soldiers, sailors, Marines)
9. Science and Engineering (like scientists, engineers, computer programmers)

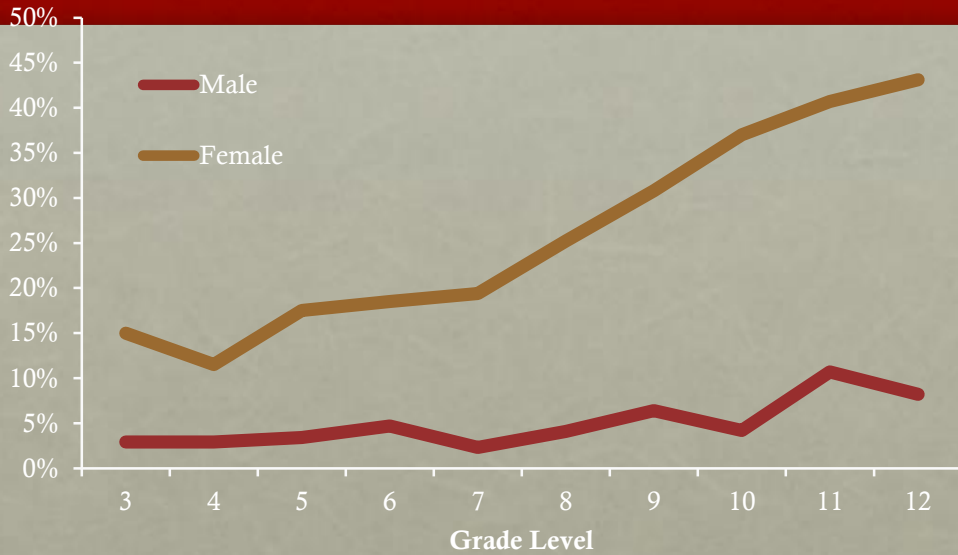
CAREER INTEREST & READINESS

Top Career choices for MS/HS students

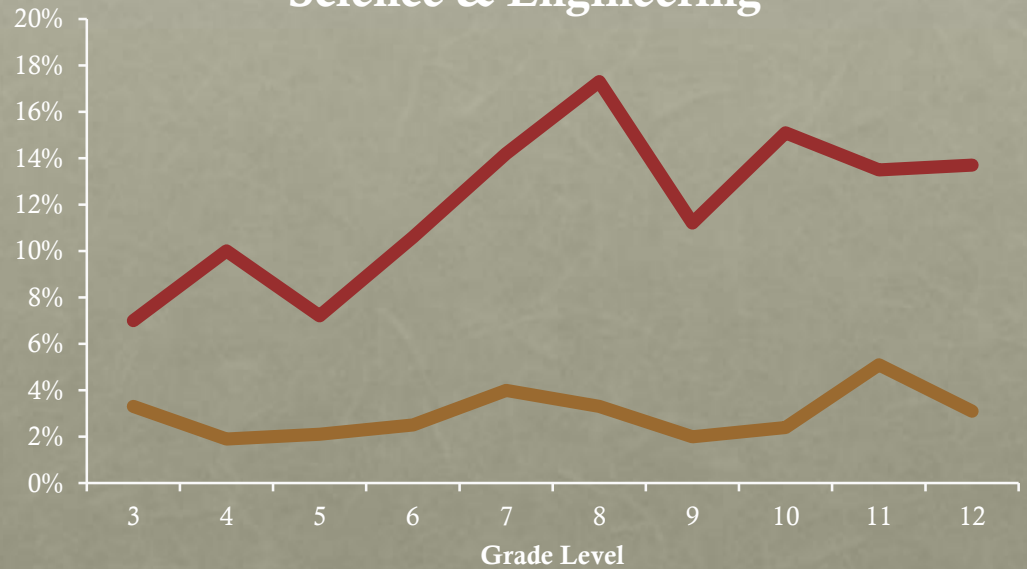
- Females:
 - Medicine/Veterinary Science (36%)
 - Entertainment & Sports (12%)
 - Arts & Communication (11%)
- Males:
 - Entertainment & Sports (25%)
 - Government, Law & Military (15%)
 - Science & Engineering (12%)

NEW DATA

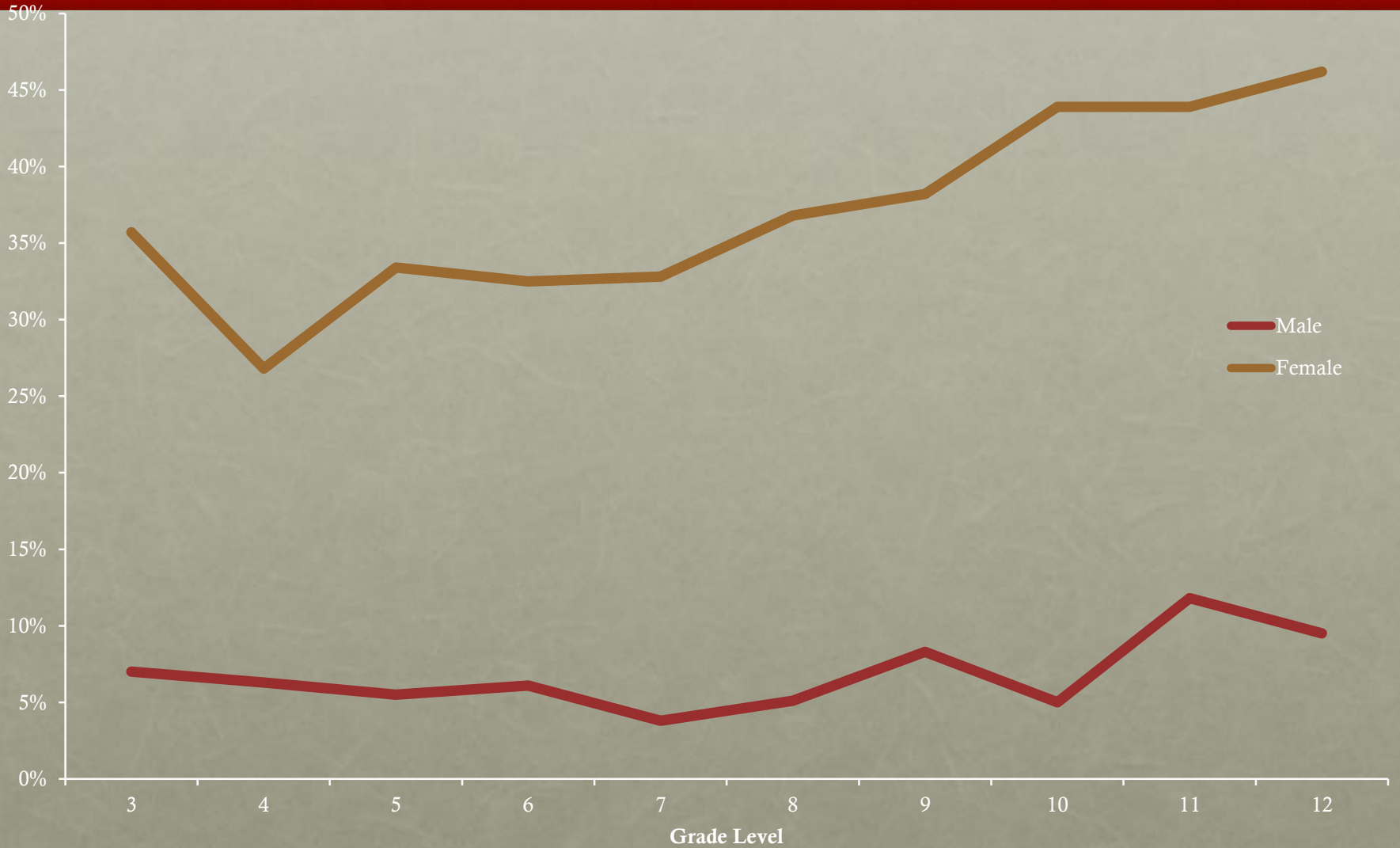
Medicine



Science & Engineering



Medicine + Veterinary



MORE HARD WORK

1. Think about two explicit ways you can improve student knowledge of STEM careers, especially those in their home communities
2. Think about two explicit ways you can improve student interest in STEM careers
3. Organize into discipline groups (S,T,E,M)

GENERAL DISCUSSION

- In practice, how is sparking interest different from maintaining interest?
- Is fostering STEM interest the same as interest in STEM careers?
- What programmatic success stories exist out there?
- Other questions?

THANK YOU!

Funding & Support:

NSF

S. D. Bechtel, Jr. Foundation

Scientific American

Indiana University

If you have any questions or comments, please contact me at:

amaltese@indiana.edu

IN HS & COLLEGE DATA

- Data from 79,000 students who completed AS or BS degrees in STEM
- High Schools with Above Average production of STEM degrees had:
 - Smaller enrollments / Smaller % FRL & Minority
 - Smaller % taking SAT
 - Not very large differences in terms of performance, but improved math seems to hold for state tests and SAT scores (only for BS)