This online version excludes my detailed comments. Should there be something about which you would like further clarification or which you believe may be in error, please contact me.

This is provided for informational purposes only.

ENCOURAGING YOUR DAUGHTER IN STEM

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MY BACKGROUND

Education

- B.A., Psychology & History (Barnard College, Columbia University)
- NY-State Pre-K-6 Teaching Certification
- M.S. and B.S., Computer Science (Norwegian University of Science & Technology)
- Ph.D., Clinical Psychology (Washington State University)

Professional

- (Former) Pre-K-8 teacher in U.S. and Norway
- (Former) University instructor (Psychology of Women; Developmental Psychology; etc.)
- Licensed Clinical Psychologist (CA, PSY#29379)

OUTLINE

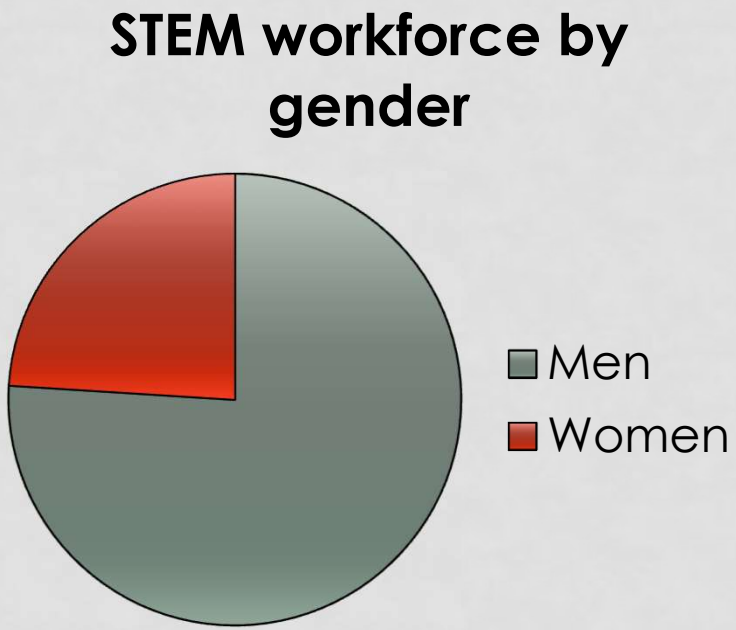
- Introduction to STEM
- Why it is important to promote girls in STEM?
  - Gender statistics in STEM
  - Gender based myths
  - Gender based discrimination
- How can you promote girls' interest in STEM?
- Questions

WHAT IS STEM?

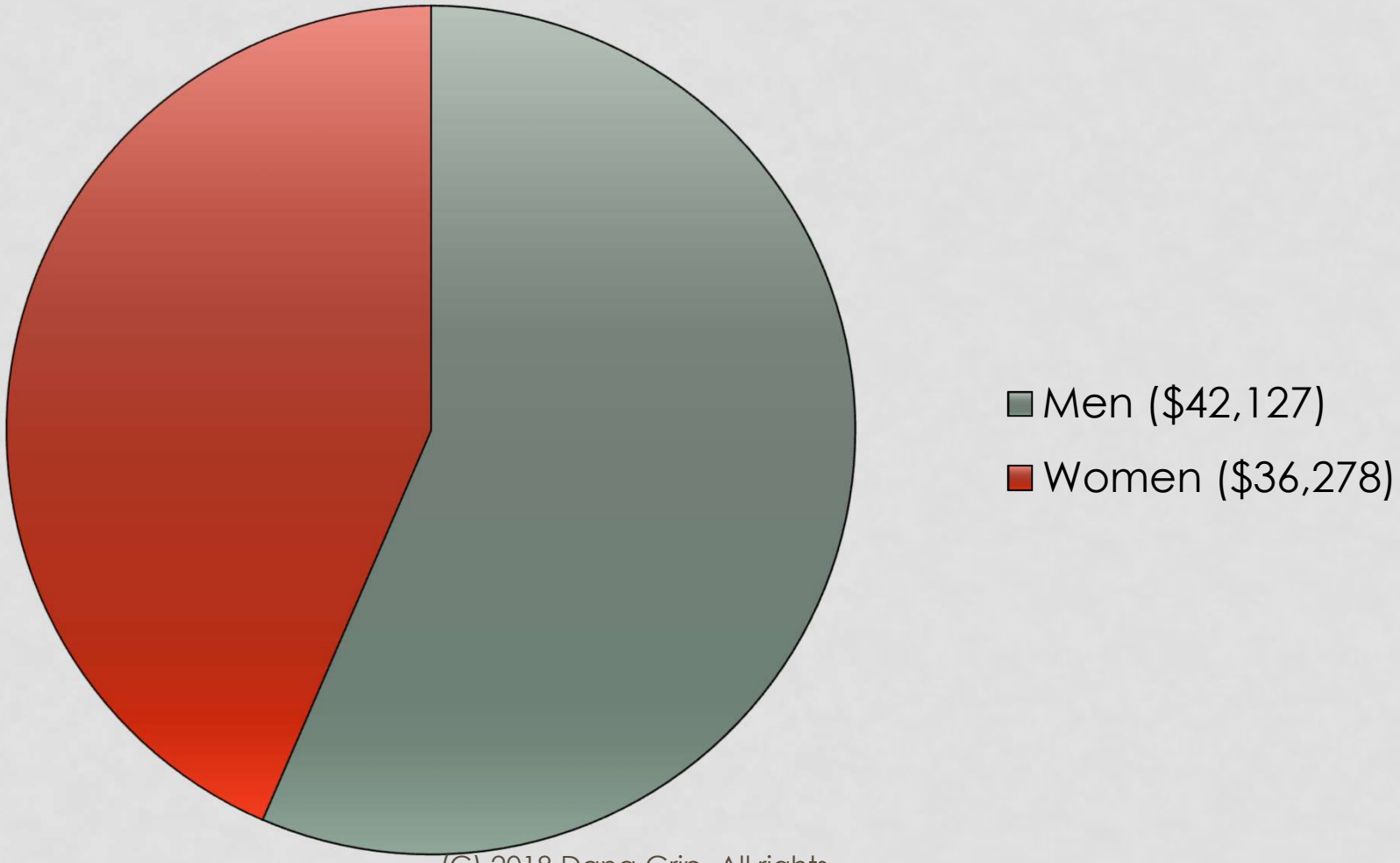
- **S**cience
  - e.g., physical and biological/agricultural sciences
- **T**echnology
  - e.g., computer/information sciences
- **E**ngineering
  - e.g., building, modeling, vehicle control
- **M**ath
  - e.g., statistics, probability, algebra, geometry, calculus

GENDER STATISTICS

WORKFORCE STATISTICS (2017)



MEDIAN ANNUAL INCOME BY GENDER



WAGE GAP (2010)

- Salary discrimination is not a function of education
- Wage gap exists even after controlling for other factors
- Reasons for the wage gap include:
  - Men are more likely to enter fields with higher salaries
  - Men are more likely to have been in the career for a longer time, thus having attained greater seniority
  - "The Mommy Track": women are more likely to only be employed part-time as a result of domestic duties, including childcare

HOW IS THIS RELEVANT?

- Women avoid male dominant fields *despite* early academic evidence of equal interest
- Stereotype threat / fear of discrimination
- Knowledge of female success can buffer stereotype threat

GENDER BASED MYTHS

WOMEN AND GIRLS IN STEM

MYTHS ABOUT GIRLS IN STEM

1. Myth: Girls are less interested in science than boys

   Truth:
   66% of 4th grade girls like science
   68% of 4th grade boys like science
   (Attrition rates for girls start around 8th grade)

2. Myth: Classroom interventions aimed at furthering girls' interest in STEM can be off-putting for boys

   Truth:
   Interventions that increase girls' interest also increase boys' interest.

"Back to School: Five Myths about Girls and Science" press release from National Science Foundation, August 27, 2007 (https://www.nsf.gov/news/news_summ.jsp?org=NSF&cntn_id=109939&preview=false)

MYTHS ABOUT GIRLS IN STEM

3. Myth: It is no longer the case that science and math teachers are biased in favor of their male students

   Truth:

   Teachers tend to respond differently to requests for help by male and female students

4. Myth: Parents and teachers cannot motivate girls who are uninterested in math and science

   Truth:

   Teaching about available careers and their relevance to the girls pursuing them is essential to helping girls gain interest

MYTHS ABOUT GIRLS IN STEM

5. Myth: Changing STEM curriculum in colleges could interfere with classes needed to "weed out" weaker students

   Truth:

   Women tend to view B-grades as inadequate while men are often fine with C-grades. Having introductory classes that "weed out" thus typically results in women dropping the class at much higher rates than men

GENDER BASED DISCRIMINATION

GENDER DISCRIMINATION

- Children are observant and notice discrimination
- Evidence of in-group discrimination is already present by early childhood
- If you avoid discussing overt or even subtle discrimination, you may reinforce a belief that observed differences are important and justifiable
- Children learn from your actions, not just your words

DISCRIMINATION STARTS EARLY

- Toys segregated by blue and pink
- Online toy websites often have "for girls" and "for boys" links to lists that show little-to-no overlap
- Princess-phenomenon
- Barbie's "math class is tough" comment (1992)

RECOGNIZE THE "LEAKY PIPELINE"

- Window of opportunity shrinks over time
- Help your daughter learn essentials early that will allow her to make an informed decision about what she pursues
- Gender stereotyping is especially prevalent in co-ed classrooms, though you also see biases among women in single-sex environments
  - Acknowledge this to your child
  - Recognize the benefits of female-only learning
  - Yale University study on biases in hiring and setting salaries

PROMOTING GIRLS' INTEREST IN STEM

SLOW THE LEAKY PIPELINE

- Bolster basic STEM skills that allow your daughter to continue in STEM
  - Online math games (see resources)
  - Home science projects (see resources)

- Encourage computer time. Learn basic programming together. Allow daily after-school time with a friend if the time is structured and spent on STEM activities.

CONVERSATIONS ABOUT STEM

- Really *listen* when your daughter is sad or scared that she's not understanding something
- Acknowledge when you don't know the material yourself, and show her how to go about finding an answer
- Remember that you have the big picture. You understand that careers have entry points. It's up to you to help your daughter understand what that means for her.

EMPHASIZE WHY IT'S WORTH PURSUING STEM FIELDS (I)

- Counter "not for me" arguments
- Projected growth of STEM jobs by 2024 = 17%
  - Projected 19% in computing
  - Projected 16% in advanced manufacturing
  - Projected 12% in engineering
- Projected growth of non-STEM jobs by 2024 = 12%

EMPHASIZE WHY IT'S WORTH PURSUING STEM FIELDS (II)

Just STEM Degree

- 9% higher wages than non-STEM educated women

STEM Degree & Profession

- 29-35% higher wages than women with neither

The gender wage gap is smaller (approx. 14%) in STEM jobs than in non-STEM jobs (approx. 21%)

MAKE STEM RELEVANT

- Increase your daughter's awareness of "socially-acceptable" ways to participate in STEM
  - Decision to continue is made during a time when girls are identifying their self-image, often one that views STEM subjects as less feminine
- Identify realistic paths for your daughter to enter a STEM field. Help her identify career goals.
  - "Not for me" represents a lack of awareness of how STEM fields can influence personal opportunities

http://files.eric.ed.gov/fulltext/EJ992152.pdf

TEACH STEM EFFECTIVELY

- Teach concepts in-context
  - Research shows girls learn better with hands-on/lab work
- Increase social aspect of concepts being taught
  - Use collaborative, team-based projects; work with your child on home experiments
- Address the potentially adverse impact of the co-ed classroom – dialogue with teachers and your child

PROMOTE AWARENESS OF SELF AND SELF-CONFIDENCE

- Help your daughter recognize herself as a complex individual, not boiled down to a stereotype
- Encourage well-roundedness
- Encourage self-affirmative behavior – e.g., discuss your daughter's competencies and goals or have your daughter write about her academic goals before taking STEM subject tests

"You cannot be what you cannot see."

- Saujani, Indian-American lawyer & politician

IMAGE MATTERS

- Expose girls to women role models in STEM
  - Posters in classrooms (e.g., Sally Ride – 1st American woman in space)
  - Games that challenge girls to recognize female mentors (e.g., make your own memory game)
  - Family outings to visit museums and other sites where you can discuss female contributions to the sciences
  - When choosing television programs, encourage those with a pro-female perspective on women in STEM
- Encourage your daughter to imagine working at a prominent place or with exciting technology
  - Talk to your child about NASA (e.g., go visit JPL)

OPPORTUNITY MATTERS

- Look to programs aimed specifically at girls
- Local businesses might have internship opportunities for your daughters to aspire to in high school
- Identify female mentors or ask a trusted STEM-field adult to share her story with your daughter; encourage her to ask questions about what steps that person took long before they had a career in that field
- Don't expect your daughter to picture herself as an engineer, for example, without giving her the resources to imagine herself in that role. Help her understand the practical implications and steps to obtain work as an engineer.

PEER INFLUENCE MATTERS

- Expose your daughter to other same-age girls with interest in science
- Consider clubs and other activities that promote STEM subjects

FATHERS MATTER

- Don't underestimate your impact on your daughter's goals and perceptions about male-female roles
- Remember that your daughter sees how you behave toward herself and women more generally and she will internalize the message
- Healthy father-daughter relationships correlated to higher academic success and better interpersonal relationships for girls

INVOLVEMENT IN HER EDUCATION

- Set high expectations, but also be realistic
- Praise consistent effort
- Don't make your daughter's successes and failures implicitly or explicitly about her gender
- Encourage healthy coping skills
- Talk to your daughter about her experiences in subjects like math, physics, biology
- Consider volunteering at your child's school, especially to promote the STEM fields as a presenter or mentor
- Be practical – how, when, where, why

COMMUNICATING WITH HER (I)

- Teach your daughter skills to cope with anxiety and setbacks
- Help her learn positive self-talk; model it for her
- Promote good choices through positive reinforcement
- Most children will strive to prove they are worth the trust and confidence you show in them

COMMUNICATING WITH HER (II)

- Avoid reinforcing imposter syndrome – compare against her own past achievements and not her peers
- Collaboratively set (continually higher) goals
- "Celebrate" failure as an opportunity to identify how to fix a problem

QUESTIONS

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