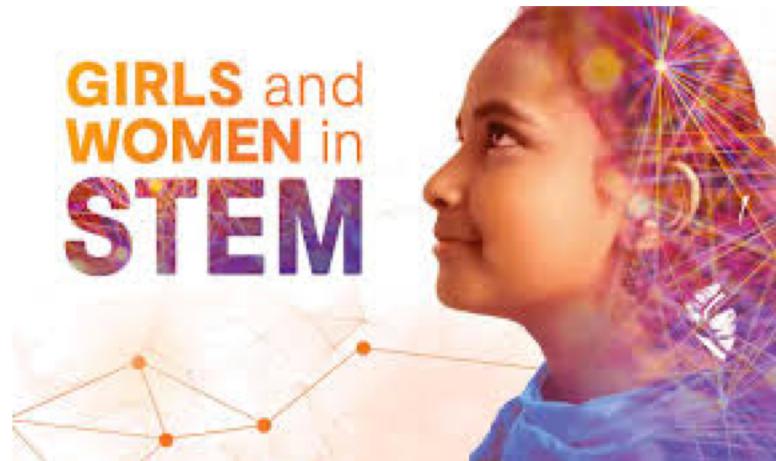


Data – Gender, Statistics, Coding and Academia



Bioconductor journey

- In 2003 when working with Des Higgins, we developed python code
- Emerging software R/Bioconductor
- Went to Lyon in Spring 2004 and submitted first Bioconductor package later than year (Bioconductor 1.6).
- Attended Bioc conferences in Seattle 10 years ago.

made4

platforms all rank 213 / 1741 posts 0 in Bioc > 14 years
build warnings updated before release dependencies 15

DOI: [10.18129/B9.bioc.made4](https://doi.org/10.18129/B9.bioc.made4)  

Multivariate analysis of microarray data using ADE4

Bioconductor version: Release (3.9)

Multivariate data analysis and graphical display of microarray data. Functions include between group analysis and coinertia analysis. It contains functions that require ADE4.

Author: Aedin Culhane

Maintainer: Aedin Culhane <[Aedin at jimmy.harvard.edu](mailto:Aedin@jimmy.harvard.edu)>

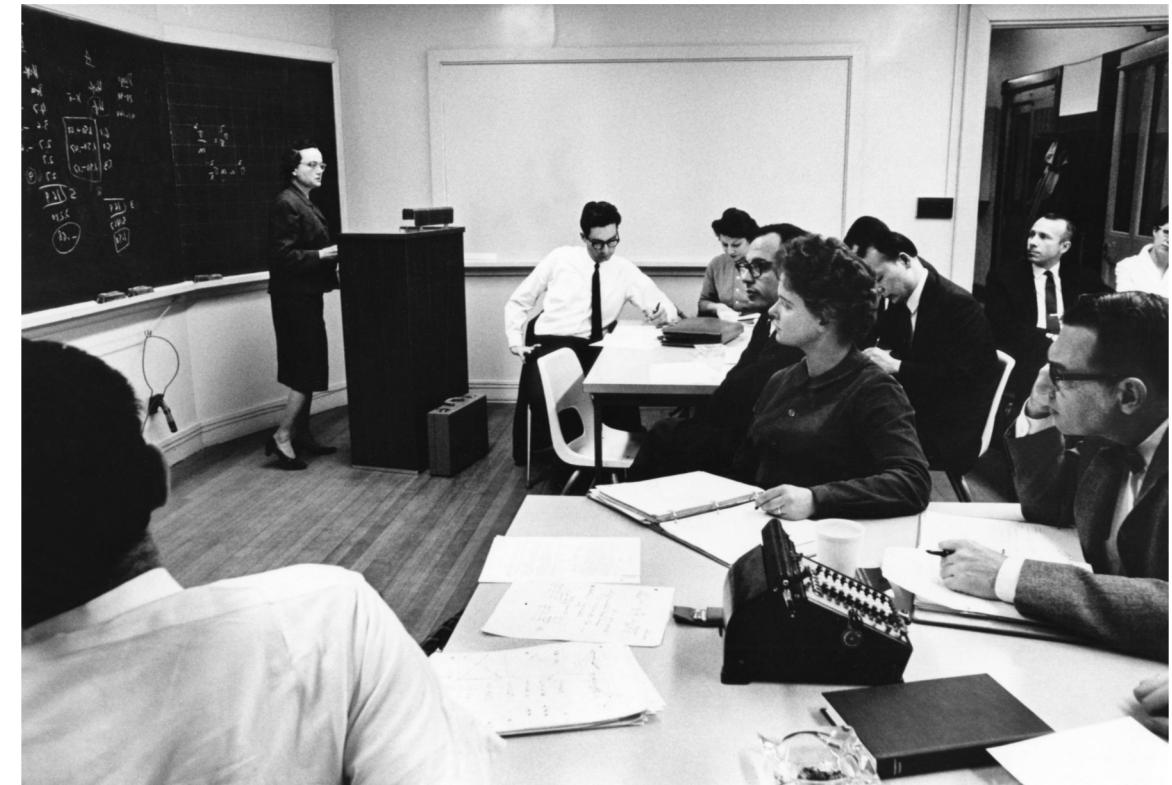
Citation (from within R, enter `citation("made4")`):

Culhane AC, Thioulouse J, Perriere G, Higgins DG (2005). "MADE4: an R package for multivariate analysis of gene expression data." *Bioinformatics*, **21(11)**, 2789-90. doi: [10.1093/bioinformatics/bti394](https://doi.org/10.1093/bioinformatics/bti394).

Jane Worcester, Chair of the Department of Biostatistics, HSPH 1973-1977



[Edwin B. Wilson's "human computer"](#)



women in the American academic biostatistics and statistics departments

TABLE 1
Expected numbers of women out of every 10 persons, 2014

	Total	Statistics	Biostatistics
Students			
Bachelor's degrees awarded	4.5	4.5	*
Master's degrees awarded	5.1	4.9	5.8
Doctoral degrees awarded	4.6	4.1	5.7
Full-time faculty			
Non-tenure-track	5.4	4.8	5.7
Tenure-track	2.8	2.7	2.8
Untenured, tenure-eligible	3.3	3.4	3.3
Tenured but not full professors	4.0	3.8	4.5
Tenured full professors	2.0	2.1	1.9

*Numbers are too small to produce a reliable estimate.



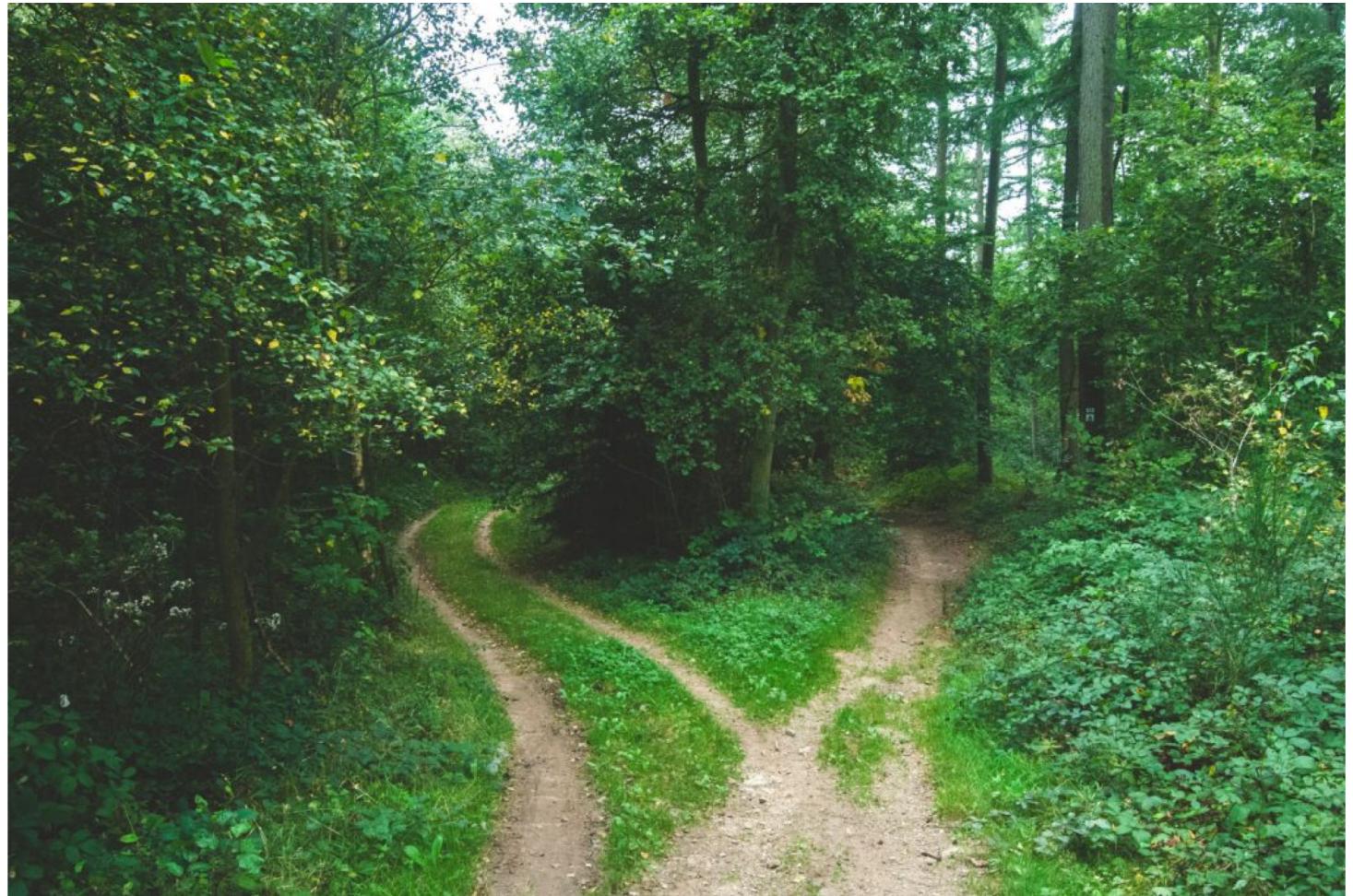
Amanda L. Golbeck is a professor of biostatistics and public health administration at the University of Montana. She is lead editor of the book *Leadership and Women in Statistics* (bit.ly/1TDn7hQ), and is incoming chair of the AMS-ASA-IMS-MAA-SIAM Data Committee.

ASMS survey % of Female Hired into positions requiring a doctorate degree (Fall 2016)

	Total Math Groups	Statistics Group	Biostatistics Group	Total Statistics & Biostatistics Groups
Total Hires	1595	91	82	173
% Female	31%	35%	44%	39%
Females as a percentage of hires				
Tenured or tenure-track	32%	26%	13%	21%
New doctoral	43%	26%	14%	23%
Not new doctoral	29%	26%	13%	21%
Previously in non-tenure-track	21%	-	23%	13%
Previously in postdoc	34%	27%	57%	39%
Non-tenured-track	30%	47%	63%	56%
New doctoral hires	28%	67%	70%	69%
Not new doctoral hires	25%	32%	54%	44%
Nondoctoral hires	55%	100%	100%	100%
Postdoc appointments	19%	80%	60%	63%
1-year appointments	28%	43%	-	43%

Path

- A new “path” may to be forged for a group traditionally under-represented
- To “compete” with the “well-worn” path, need comprehensive plan
- If the paths compete for resources, may need incentives to boost the lesser path



NCBI Hackathons

Ben Bushby, Slides from Allissa Dillman

Who: Researchers & coders

What: Build tools for the biomedical community

Why: Collaboration and expertise sharing



Engaging Women

Ben Bushby, Allissa Dillman

NCBI Hackathons had ~ 20% female participation

->Women-led Hackathon



NCBI Hackathons

~ 20% female

Why are women discouraged to apply?

Ben said females (incorrectly) have self-perception of being under qualified.

What worked;

- Change of announcement wording
- Quiz/pre register tool
- Direct outreach (biggest impact)



Direct Outreach



Women Led Hackathon
“This women hackathon
experience was incredibly
empowering!”

46 scientist and coders
8 new software tools, manuscripts





Why is this
needed?

Article

It Had to Be You (Not Me)! Women's Attributional Rationalization of Their Contribution to Successful Joint Work Outcomes

Michelle C. Haynes¹ and Madeline E. Heilman²

Personality and Social Psychology Bulletin
XX(X) 1–14
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/0146167213486358
psp.sagepub.com

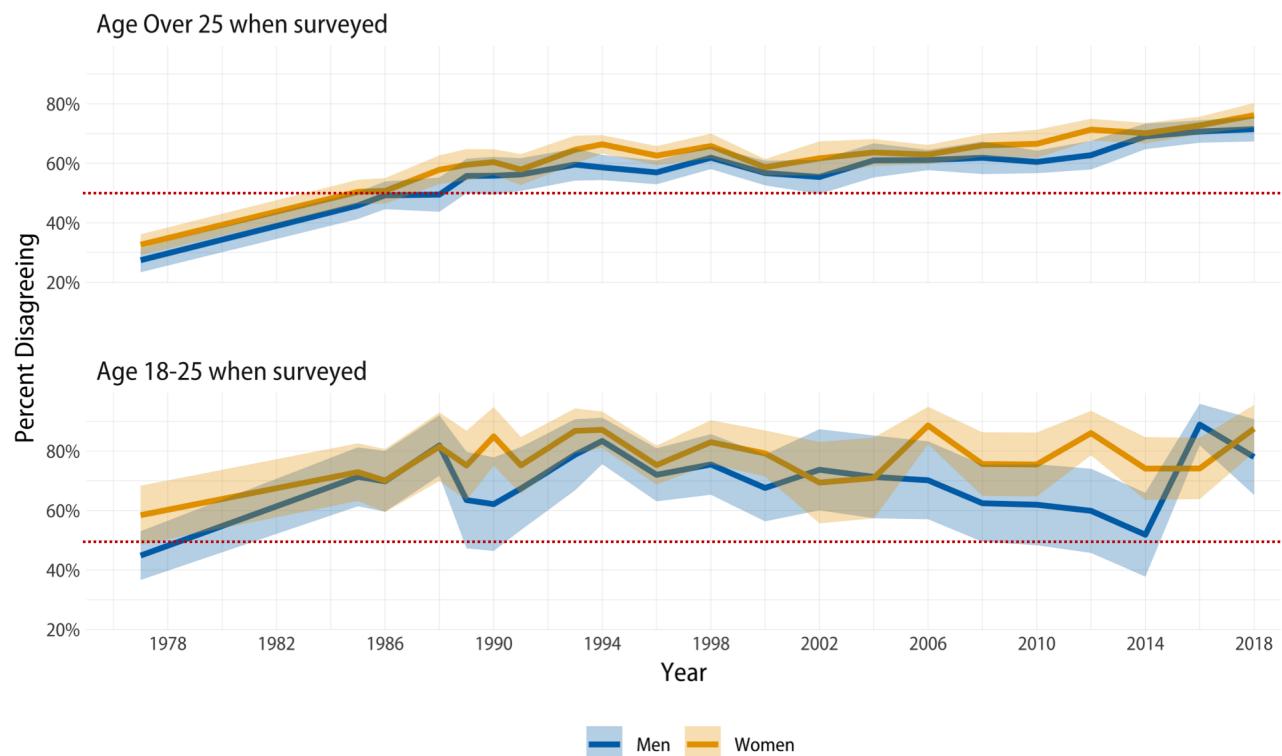

Woman undervalue their skillset whereas men overvalue in mixed gender teams.

Importance of individualized assessment (Hayes & Heilman 2013)

Breadwinner/caregiver stereotype

General Social Survey of people aged 18-25 find both men and women express gender roles

Disagreement with the statement, 'It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family'



<http://gss.norc.org/get-the-data/>

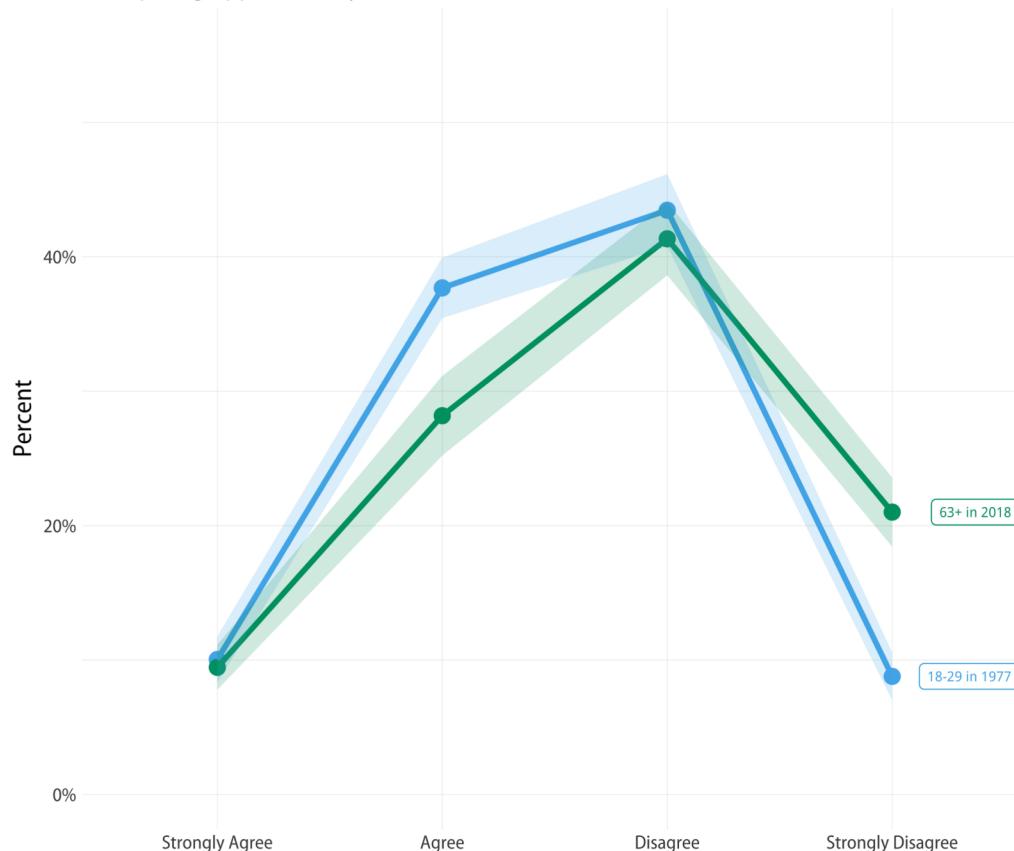
<https://kieranhealy.org/blog/archives/2019/03/22/a-quick-and-tidy-look-at-the-2018-gss/>

Are stereotypes changing?

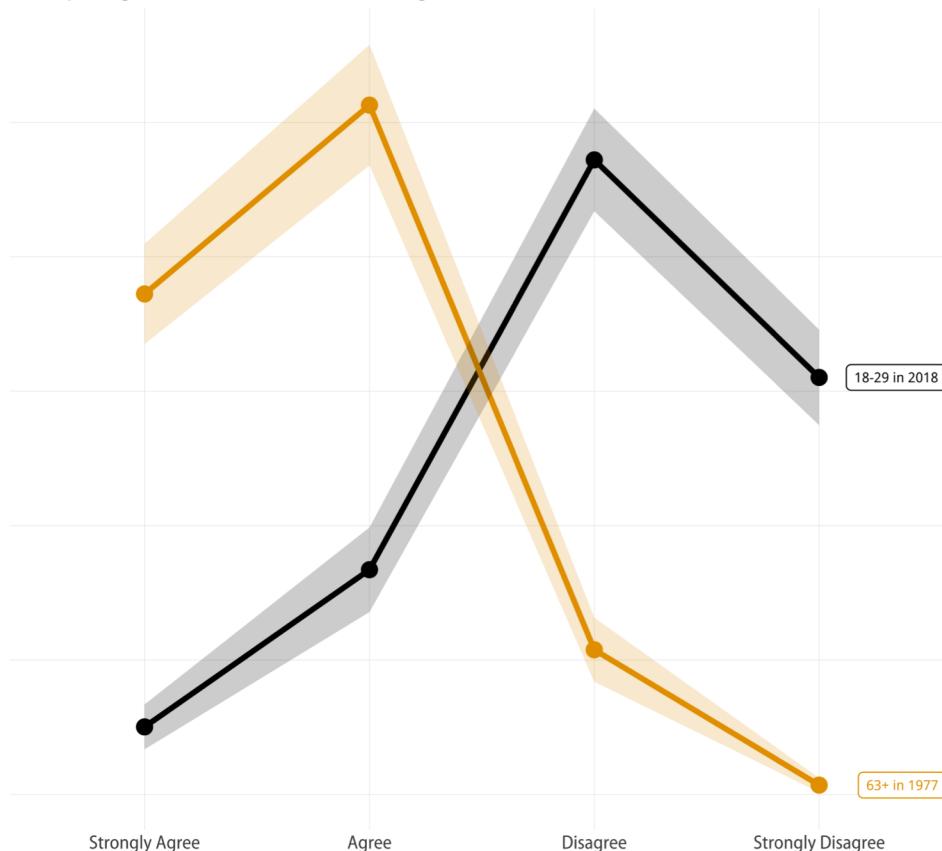
Generational Replacement, or, People Don't Change Much, They Just Get Old

Responses to the statement 'It is much better for everyone involved if the man is the achiever outside the home and the woman takes care of the home and family'

Comparing Approximately the Same Cohort in 1977 and 2018

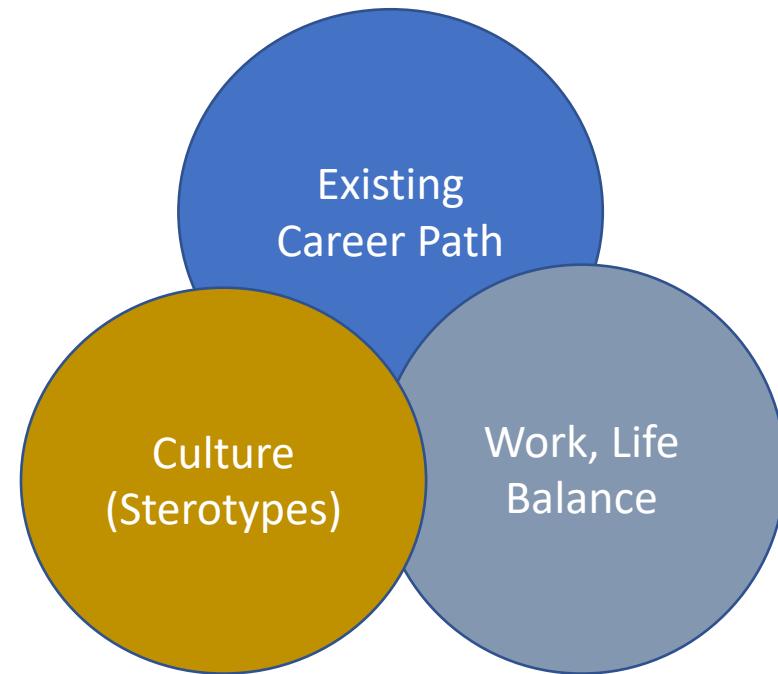


Comparing the Old in 1977 vs the Young in 2018



Its not just engaging it retaining

- Are efforts to engage women working?



https://www.rse.org.uk/cms/files/advice-papers/inquiry/women_in_stem/tapping_talents.pdf

Recruiting women: Tenure track Extension Clock fatherhood bonus

The success rate for male candidates increased by 19.4 % after stopping the clock was offered.

For women, at top institutes, the rate fell by 22.4 %



Antecol et al., 2016 Equal but Inequitable: Who Benefits from Gender-Neutral Tenure Clock Stopping Policies?

<https://www.insidehighered.com/news/2016/06/27/stopping-tenure-clock-may-help-male-professors-more-female-study-finds>

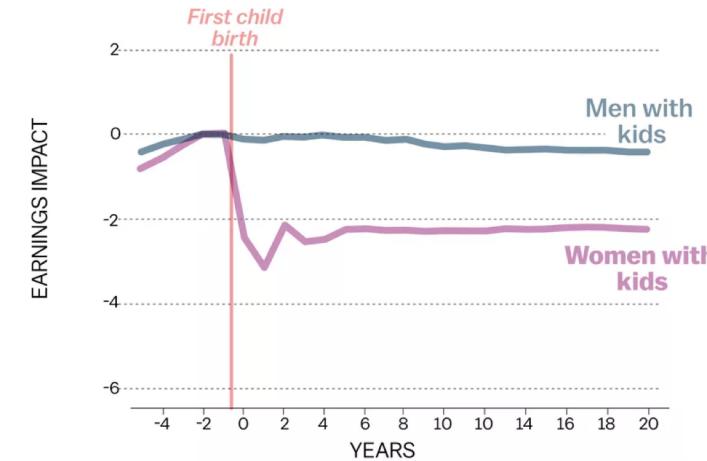
<https://www.americanscientist.org/article/when-scientists-choose-motherhood>

<https://www.nytimes.com/2016/06/26/business/tenure-extension-policies-that-put-women-at-a-disadvantage.html>

Not just academia

- A child costs > maternity pay
- Wages are reduced 8% within 5 years. Professional women's lifetime wages >\$250K.
- Tendency for high-skill women delay or avoid childbearing altogether.

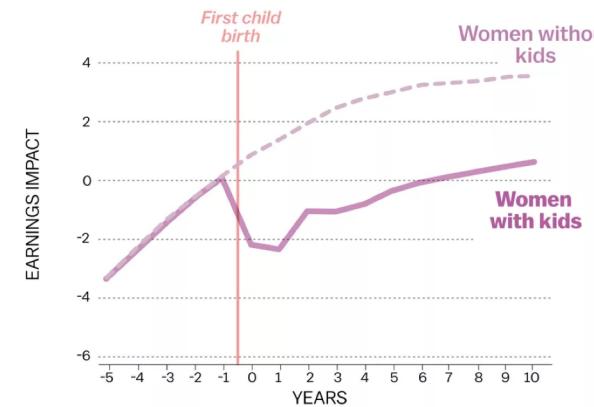
Women's earnings drop significantly after having a child. Men's don't.



Source: "Children and gender inequality: Evidence from Denmark,"
National Bureau of Economic Research

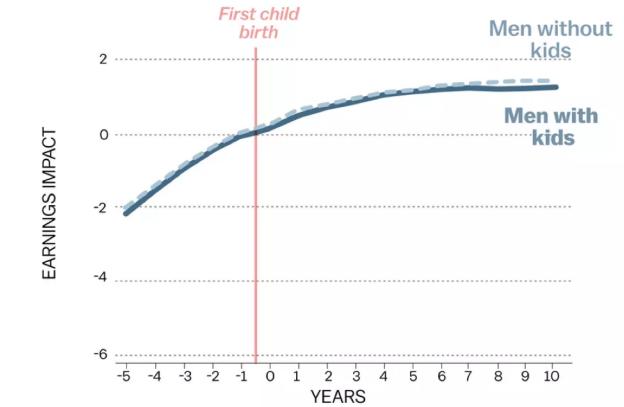
Vox

Having a kid correlates with lower earnings for women



Source: "Children and gender inequality: Evidence from Denmark,"
National Bureau of Economic Research

Having kids doesn't affect men's salaries



Source: "Children and gender inequality: Evidence from Denmark,"
National Bureau of Economic Research

Vox

Wilde et al., The Mommy Track Divides: The Impact of Childbearing on Wages of Women of Differing Skill Levels
<https://www.nber.org/papers/w16582.pdf>
<https://onlinelibrary.wiley.com/doi/full/10.1111/irel.12225>

Getting better? Caregiver legislation

BRIEF

JPMorgan Chase pays \$5M to settle dads' parental leave suit

AUTHOR

Ryan Golden
@RyanTGolden

PUBLISHED

June 4, 2019

Dive Brief:

- JPMorgan Chase will pay \$5 million to settle a class action lawsuit with male employees who alleged the company discriminated against them when it denied them the same amount of paid parental leave as women at the company, according to a statement from Liberties Union (ACLU).

WHAT IS FRD?

Family Responsibilities Discrimination (FRD), also called caregiver discrimination, is employment discrimination against workers based on their family caregiving responsibilities.

Pregnant women, mothers and fathers of young children, breastfeeding women, and employees with aging parents or sick spouses or partners may encounter family responsibilities discrimination. They may be rejected for hire, passed over for promotion, demoted, harassed, or terminated — despite good performance — because their employers make personnel decisions based on stereotypical notions of how the employee will or should act given their family responsibilities.

WorkLife Law's [FRD Fact Sheet](#) and [FRD Frequently Asked Questions](#) provide more information about the types of workplace situations that commonly lead to family responsibilities discrimination. For the latest information on FRD litigation, see our 2016 litigation update report [Caregivers in the Workplace](#).

Getting Better

- Bioconductor
 - Diversity in Bioc conference, Technical board through more transparent governance, slack engagement
- Attracting women
 - Direct reach out
- Retaining women
 - Culture/Attitudes, caregiver, work-life balance

But likely to take a little while longer.....

More important thing is to be aware of the data
Recognize that subconscious bias exists