

The unequal impact of parenthood in academia

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joint work with Allison C. Morgan, Samuel F. Way, Michael J. D. Hoefer, Daniel B. Larremore, & Mirta Galesic



Gendered publishing gap

1984

THE PRODUCTIVITY PUZZLE:
PERSISTENCE AND CHANGE IN
PATTERNS OF PUBLICATION OF
MEN AND WOMEN SCIENTISTS

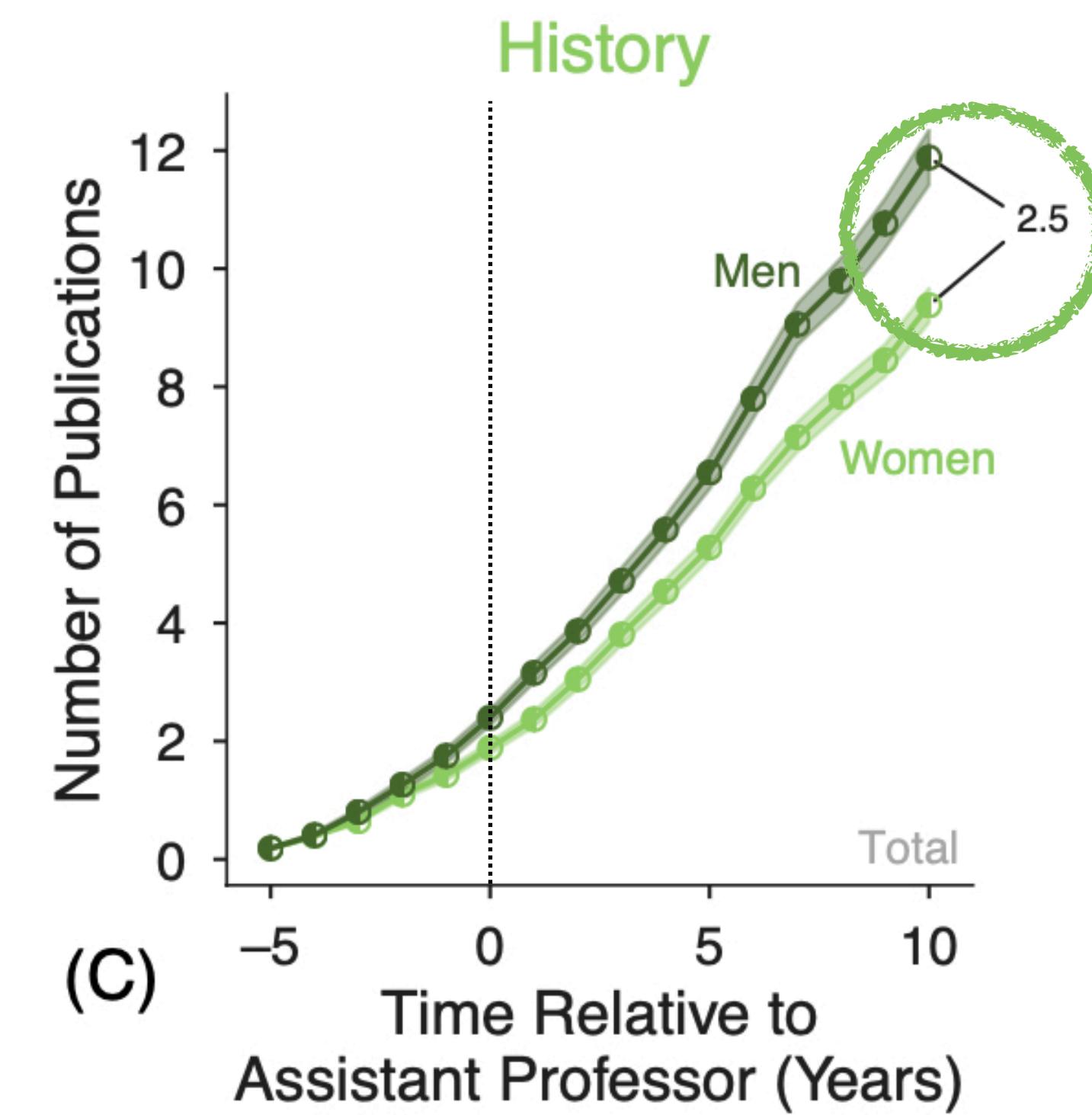
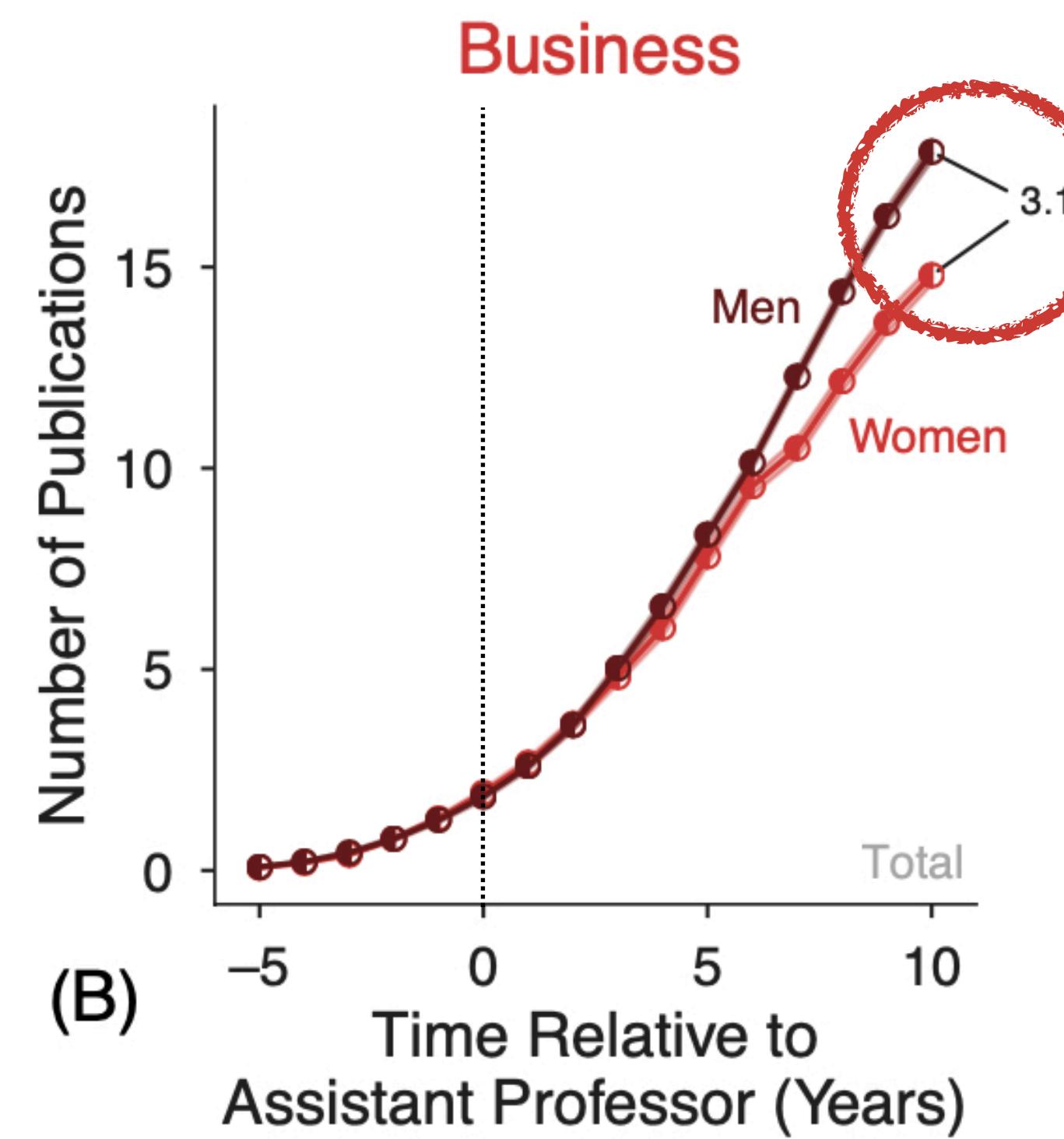
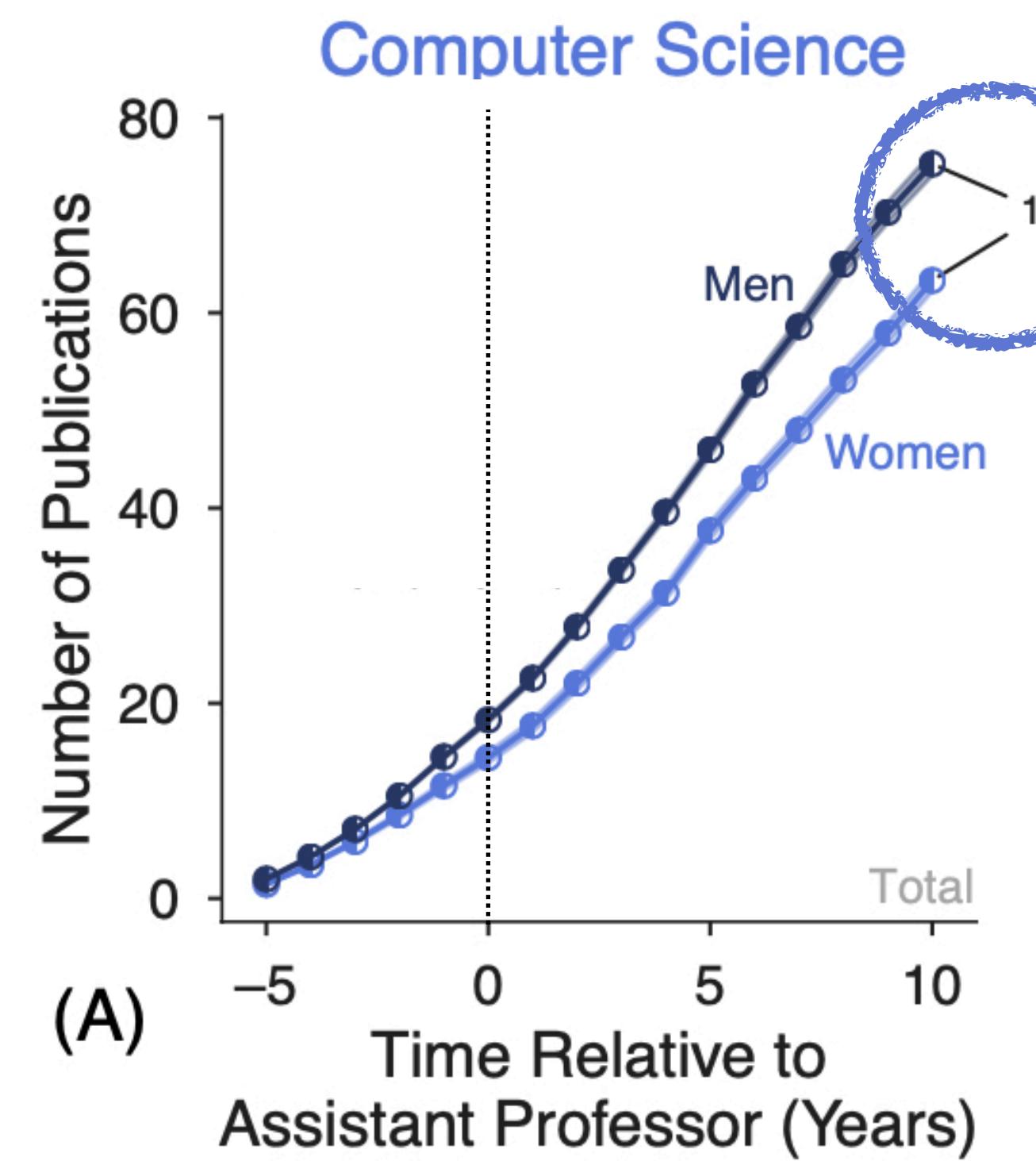
Jonathan R. Cole and Harriet Zuckerman



- 36 years ago!
- references 50 *past* studies showing *women publish less than men*
- claims pattern is stable back to 1920s
- matched-pair design of early career researchers ($n=263$ pairs)
- women cited equally paper-for-paper
- women just write fewer papers
- coins term "productivity puzzle"

Gendered publishing gap

In our data (U.S. faculty):



Gendered publishing gap

40 years of work =

Gendered publishing gap

40 years of work = many explanations...

SEX DIFFERENCES IN RESEARCH PRODUCTIVITY: NEW EVIDENCE ABOUT AN OLD PUZZLE*

Name _____

Research Reports

RESEARCH ARTICLE

Historical comparison of gender inequality in scientific careers across countries and disciplines

GENDER DIFFERENCES IN PRODUCTIVITY

Emotional Labor in Academia: The Case of Professors

By MARCIA L. BELLAS

Published: 05 April 2017

Faculty Service Loads and Gender: Are Women Taking Care of the Academic Family?

Publishing while female

Are women held to higher standards? Evidence from peer review.*

NATURE | TREND WATCH

Teaching load could put female scientists at career disadvantage

Male scientists in the United Kingdom report teaching less than their female counterparts, while women and minorities tend to feel disadvantaged in their careers.

Gender, Work Time, and Care Responsibilities Among Faculty[†]

Joya Misra, Jennifer Hickes Lundquist, Abby Templer

First published: 30 May 2012 | <https://doi.org/10.1111/j.1573-7861.2012.01319.x> | Citations: 102

Gendered publishing gap

40 years of work = many explanations, but no answer

- ▶ institutional factors
- ▶ teaching and service work
- ▶ research specializations
- ▶ biases in peer review
- ▶ quality of writing
- ▶ career lengths
- ▶ parenthood

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**Why So Slow?
The Advancement of Women**

Meta-Research: Task specialization across research careers



Igor Costas, Cassidy R Sugimoto, Vincent Larivière, Gabriela F Nane

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Gendered publishing gap: parenthood

"Other countries have social safety nets. The U.S. has women."

Anne Helen Petersen Nov 11, 2020 ♡ 82 72 ↑



Andrew Caballero-Reynolds / Getty

Petersen (Nov. 2020)

The decline of women's research production during the coronavirus pandemic

Preprints analysis suggests a disproportionate impact on early career researchers.

FEMINIST FRONTIERS | Free Access

COVID-19 and the gender gap in work hours

Caitlyn Collins ✉, Liana Christin Landivar, Leah Ruppanner, William J. Scarborough

First published: 02 July 2020 | <https://doi.org/10.1111/gwao.12506> | Citations: 20

Comment | Published: 15 July 2020

Unequal effects of the COVID-19 pandemic on scientists

Kyle R. Myers ✉, Wei Yang Tham, Yian Yin, Nina Cohodes, Jerry G. Thursby, Marie C. Thursby, Peter Schiffer, Joseph T. Walsh, Karim R. Lakhani & Dashun Wang ✉

Nature Human Behaviour 4, 880–883(2020) | [Cite this article](#)

89k Accesses | 29 Citations | 36

Women in science are battling both Covid-19 and the patriarchy

The pandemic has worsened longstanding sexist and racist inequalities in science. Here, 35 female scientists

In the wake of COVID-19, academia needs new solutions to ensure gender equity

Jessica L. Malisch^{a,1} ✉, Breanna N. Harris^b, Shanen M. Sherrer^c, Kristy A. Lewis^d, Stephanie L. Shepherd^e, Pumtiwitt C. McCarthy^f, Jessica L. Spott^g, Elizabeth P. Karam^h, Naima Moustaid-Moussa^{i,j}, Jessica McCrory Calarco^k, Latha Ramalingam^{i,j}, Amelia E. Talley^l, Jaclyn E. Cañas-Carrell^{m,n}, Karin Ardon-Dryer^o ✉, Dana A. Weiser^p, Ximena E. Bernal^{q,r}, and Jennifer Deitloff^s

Study design

Combine information on timing of parenthood **and** productivity over time **and** leave policies

► Survey (2017-18)

- $n=3064$ tenure track faculty [a 17.5% response rate]
- U.S. research intensive institutions (PhD-granting)
- Computer Science / Business / History

- This survey is about **patterns in faculty hiring, advancement, and productivity** in the North American academic system.
- It is currently open **only for tenured or tenure-track faculty in business or history**.
- The survey has 2 parts:
 - Part 1: Questions on sociodemographic characteristics (**1-2 minutes**)
 - Part 2: Questions on your experience as faculty (**10-12 minutes**)
- There is a \$500 cash lottery for participants. The winner will be informed by email.
- Personally identifiable information will be kept confidential.
- This study is IRB approved.

► Publications

- 100,972 linked publications (books, papers)

The study "**Understanding the Network Structure and Dynamics of the Academic Scientific Workforce**" (CU IRB protocol no. 16-0441) is conducted by researchers from the University of Colorado at Boulder and the Santa Fe Institute. This study is supported by the NSF programs Science of Science & Innovation Policy, and the Science of Broadening Participation (SBE award 1633791).

► Institutions ($n=450$)

- prestige (ranking)
- parental leave policies (hand collected)

Your participation is voluntary and you may stop at any time. Your answers will be used only in this study, except as required by law.

Basic statistics: parenthood

▶ **Academia is a family business**

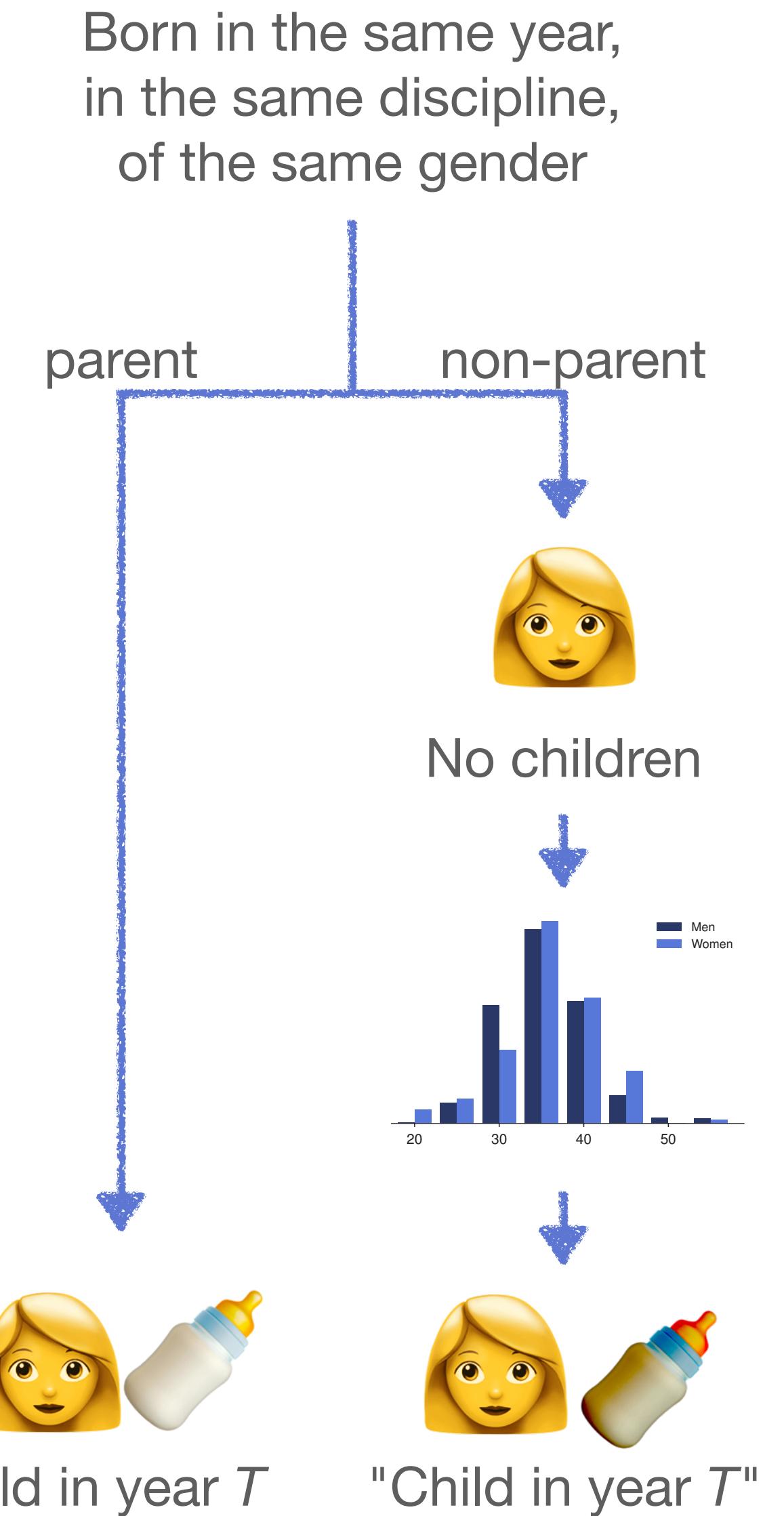
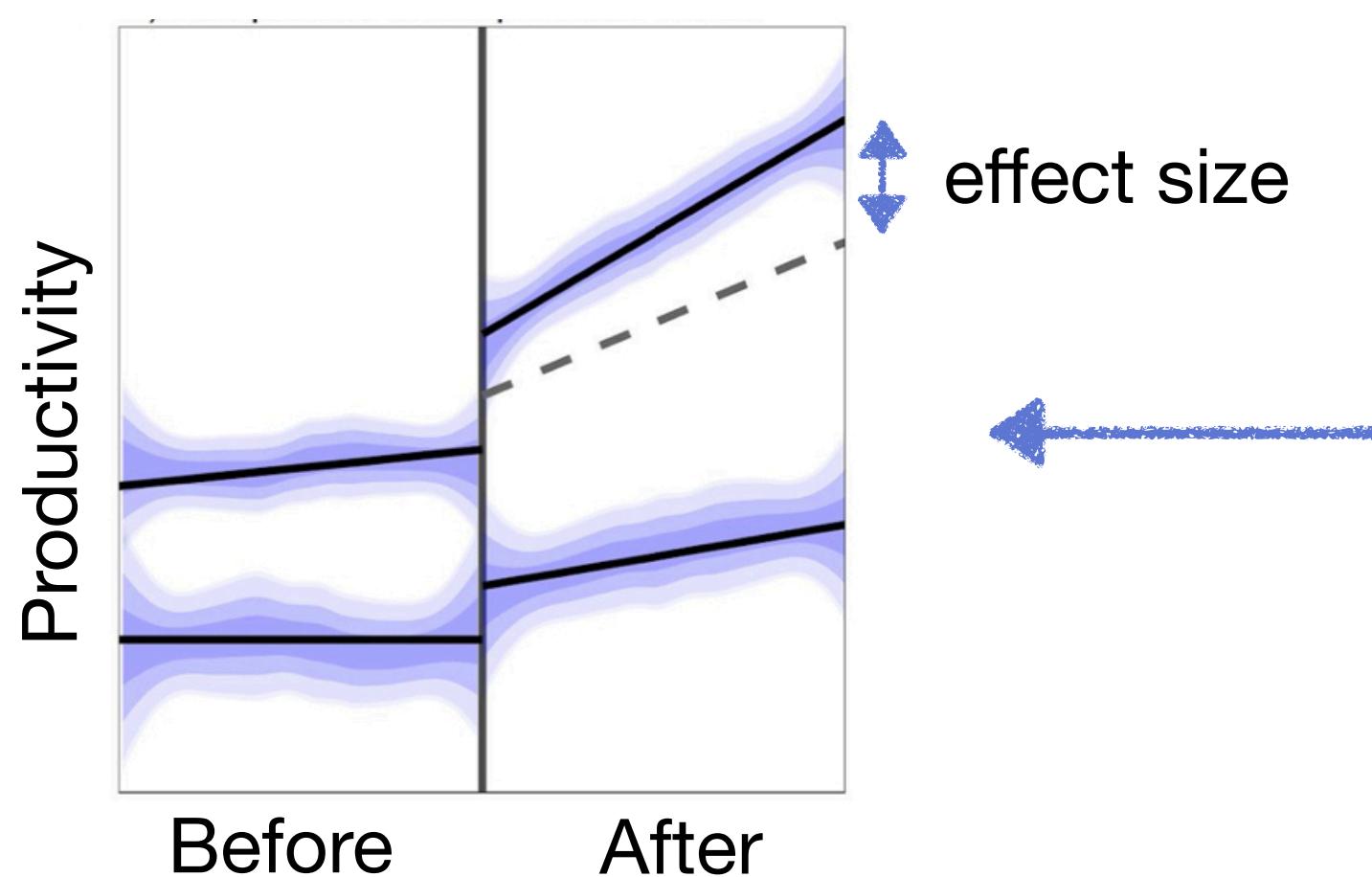
- most faculty 40+ have kids: 71% women, 82% men
- 39% had first child before first faculty job
- avg. age of first child: 33 (same for women and men)
 - compared with U.S. pop: 26 (women) vs. 31 (men)
- parents not more/less likely at high/low prestige institutions
- avg. num. of children: 1.8 (women) vs. 2.2 (men)



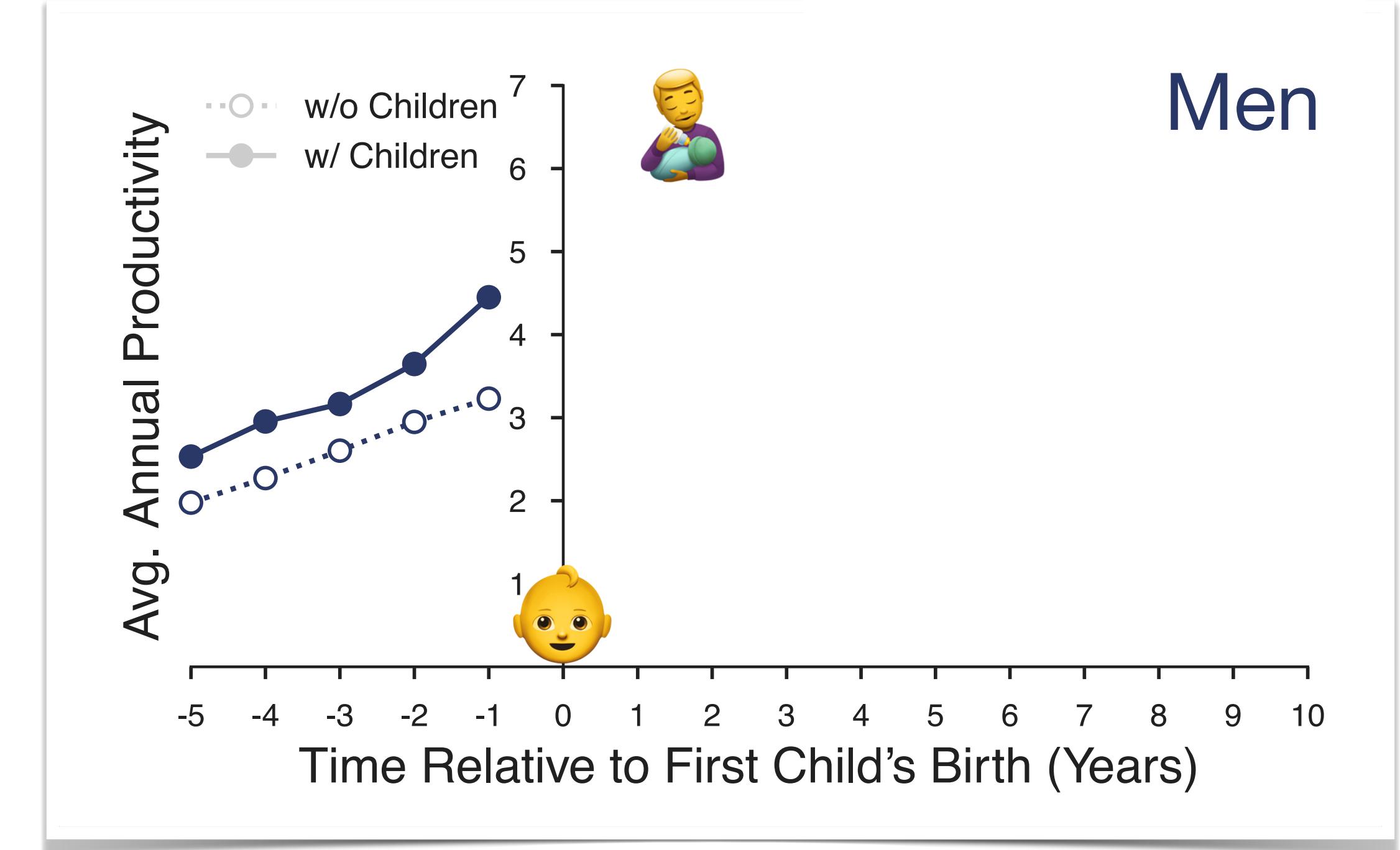
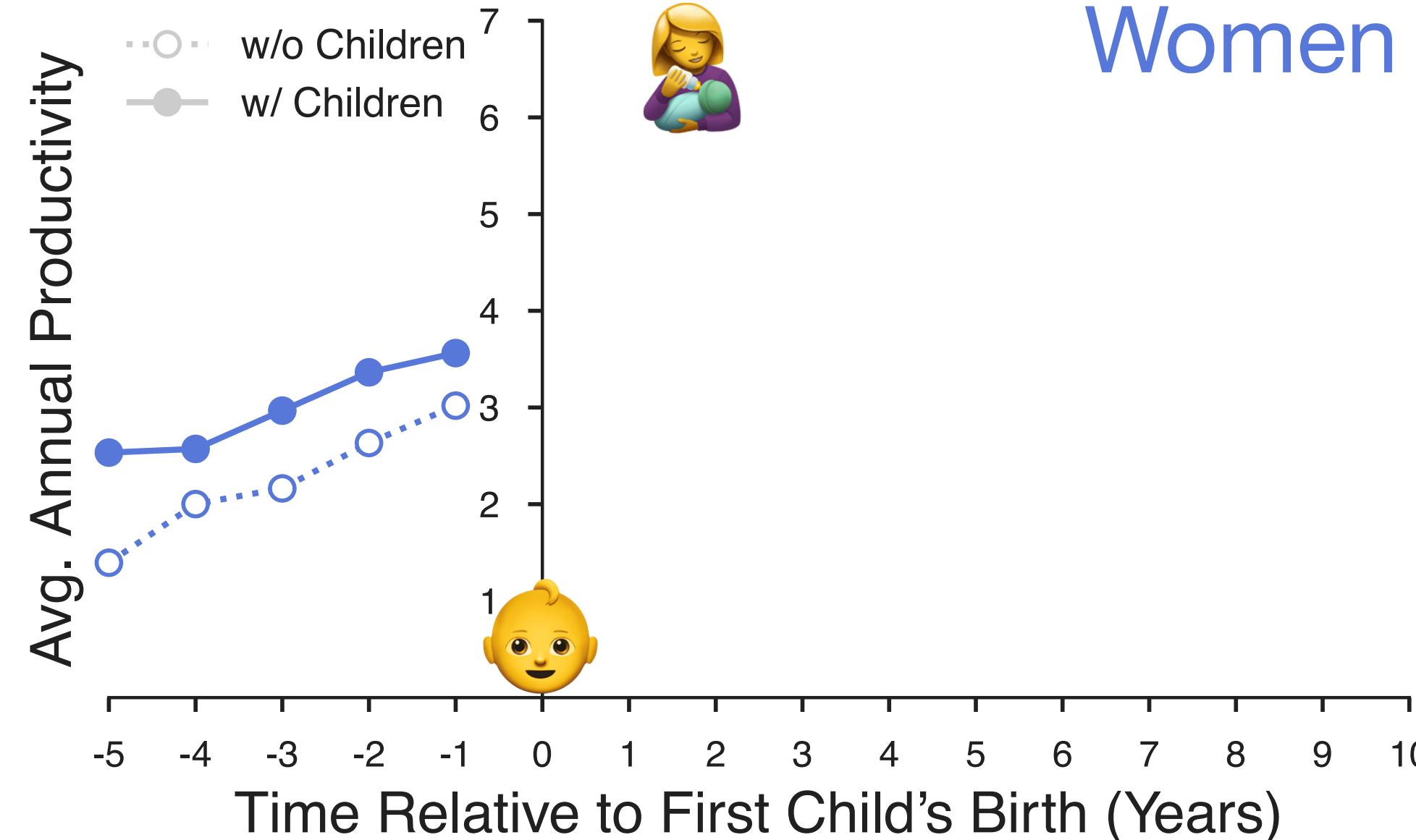
Causal inference setup

► Comparative interrupted time series (CITS)

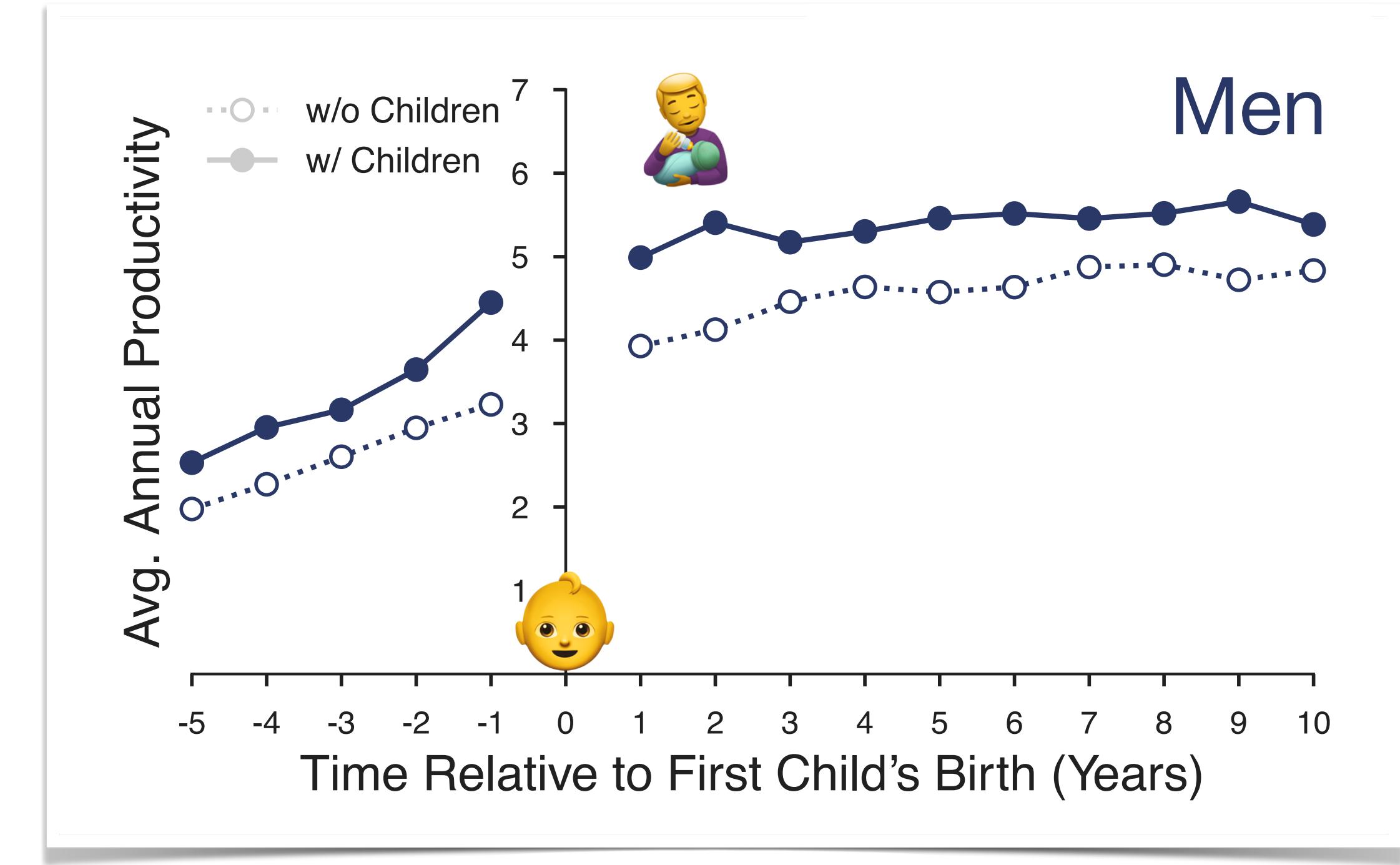
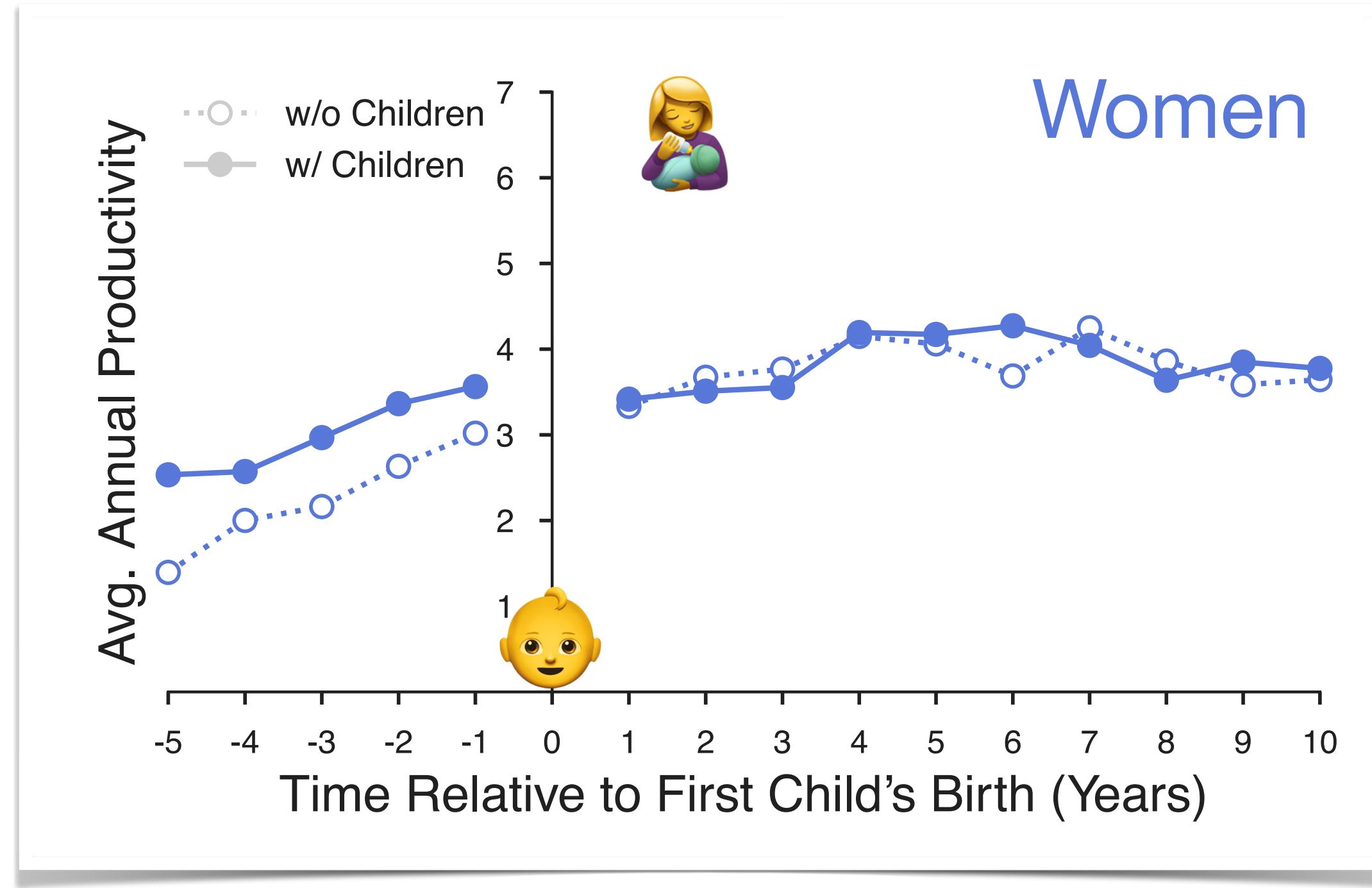
- matched-pair design [parent + non-parent]
- match on born same year + same discipline + same gender
- match on year of first child [survey vs. draw from $\Pr(\text{birth} \mid \text{age})$].
- plot publications per year -5 yrs before child → +10 yrs after child



Productivity differences: CS



Productivity differences: CS



on average:

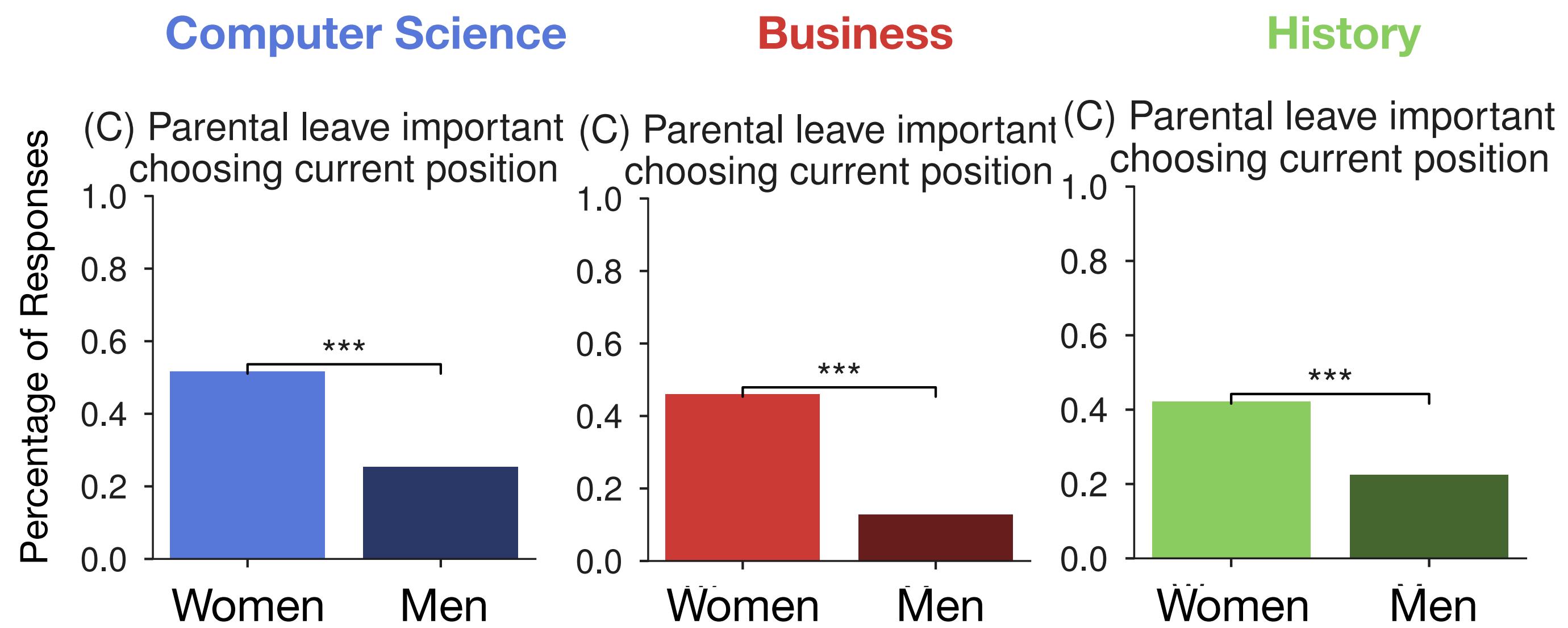
- ▶ women's pub. rate: negative ⚡ shock [-17% CS, -24% Business, -48% History]
- ▶ men's pub rate: generally* no shock [⚡ shocks = ⚡ shocks]
- ▶ shock ⚡ greatest in History (less collaboration), smallest in CS (more collaboration)
- ▶ CS shock: 17.6 fewer papers than fathers over 10 years = a 5 year productivity gap

* fathers in History experience a modest, statistically significant negative shock

Parental leave policies: work/life

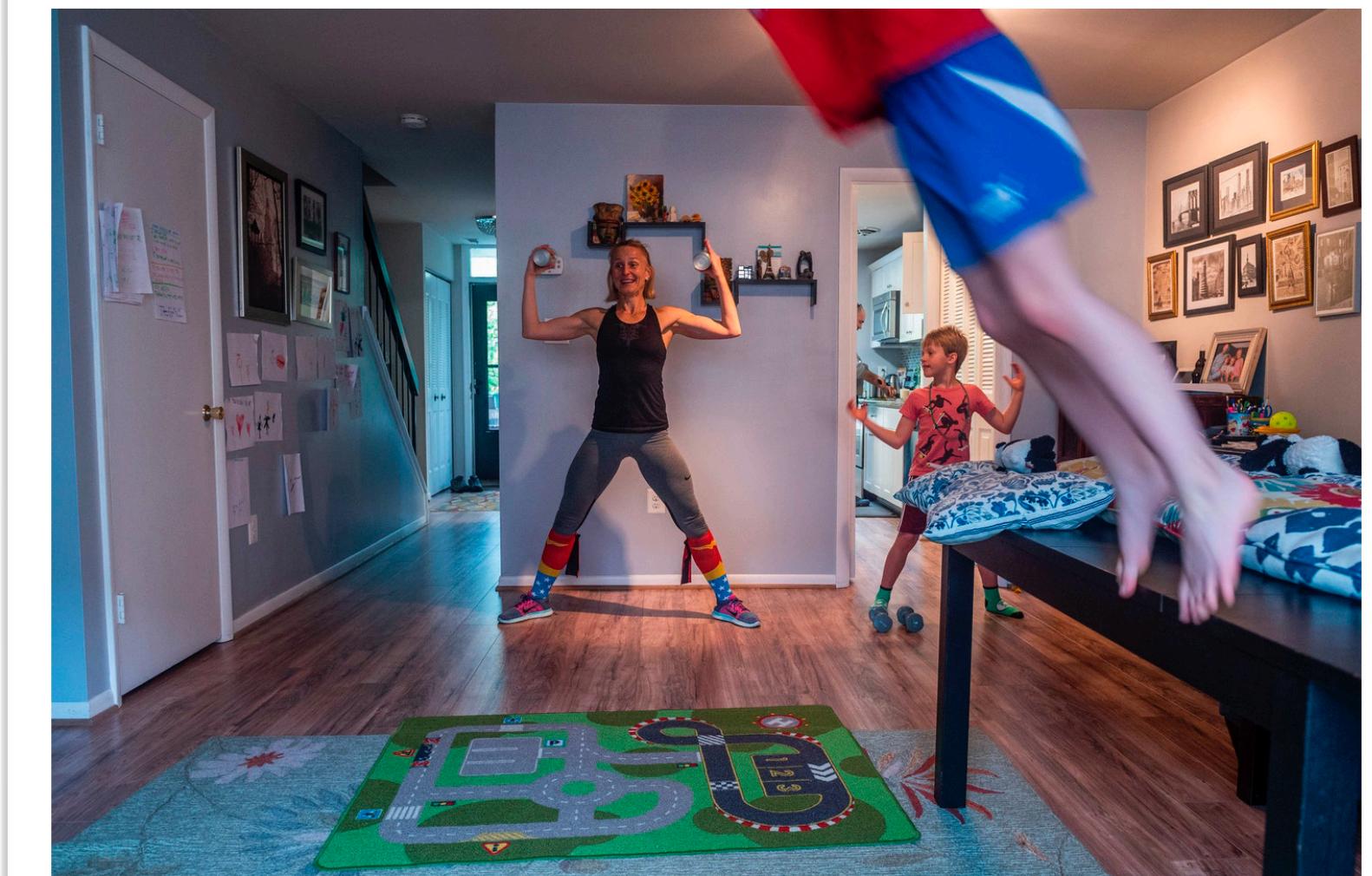
Nearly 1/2 of women (45.9%) vs. 1/5 of men (20.6%) said:

- leave policies *somewhat* or *very important* in choosing current faculty job
- strong leave policies are under-used recruitment + retention tool



"Other countries have social safety nets. The U.S. has women."

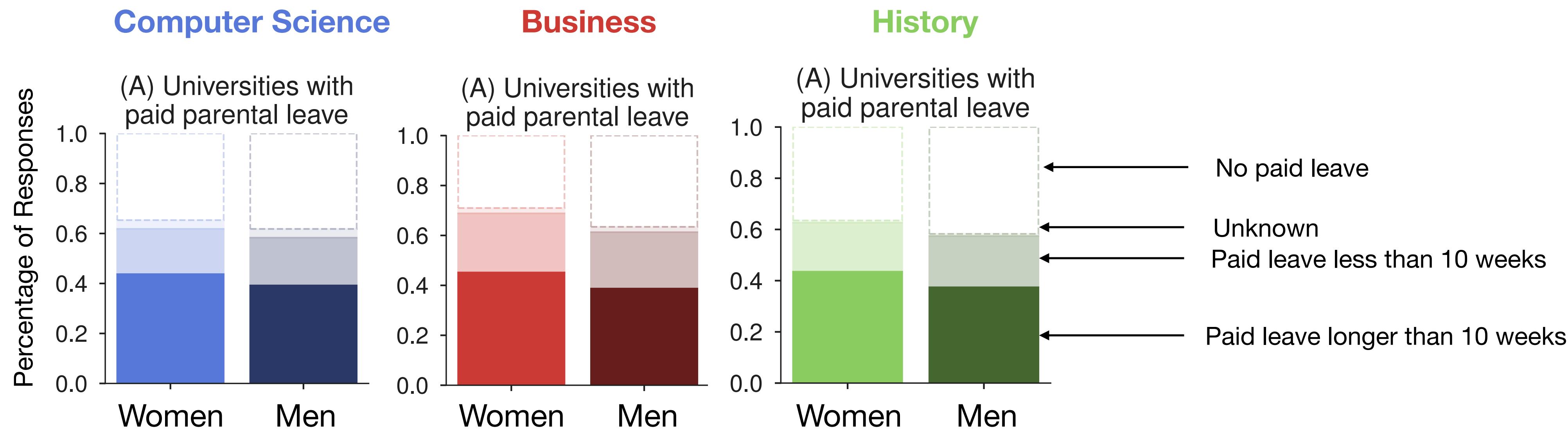
Anne Helen Petersen Nov 11, 2020 ❤ 82 🗃 72 ↗



Andrew Caballero-Reynolds / Getty

Parental leave policies: availability

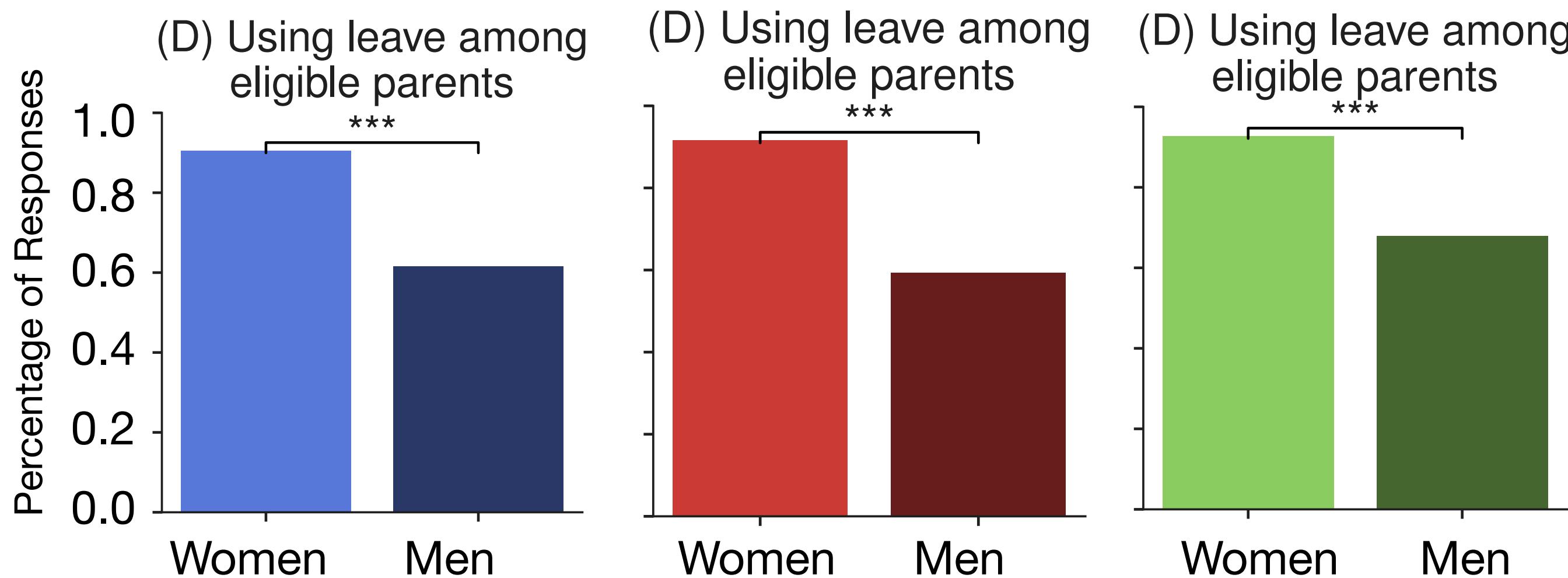
- Only 64% of institutions had a paid parental leave policy!
- Average length: 15 weeks (women) and 12 weeks (men)
- Most did not specify if relief covered teaching, service, research, etc.



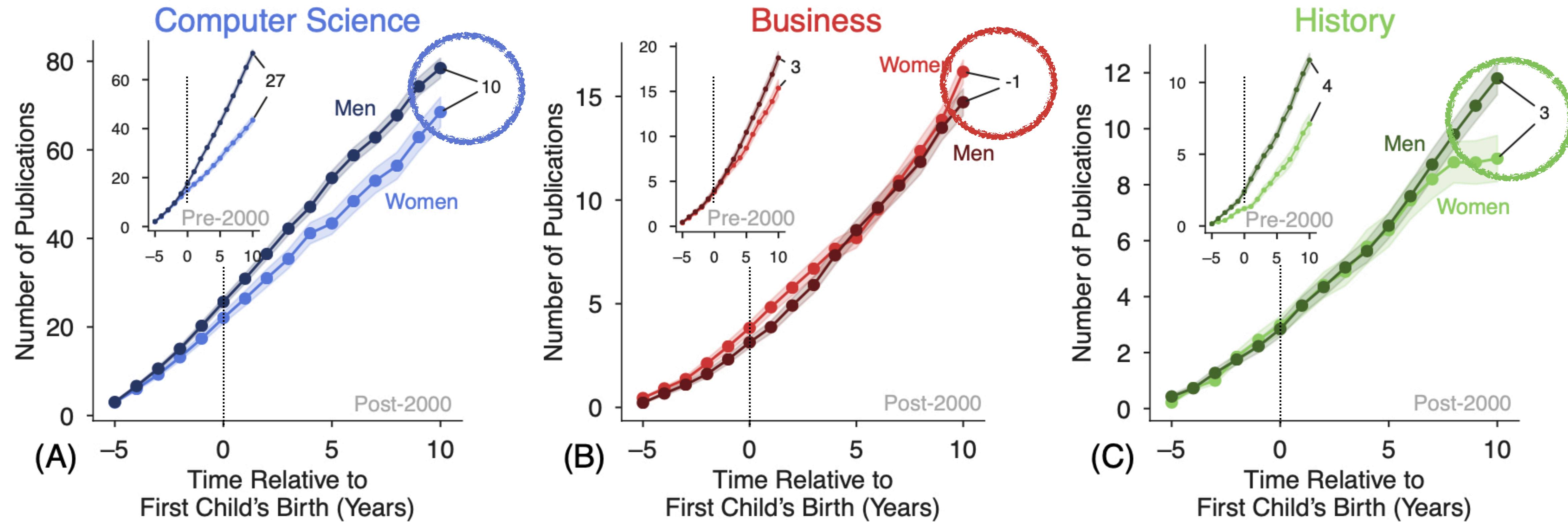
Differences are shrinking



- Gender neutral parental leave benefits more available since 2001
- Since 2000, (eligible) fathers use parental leave nearly 2x more (38.7% → 67.6%)
- But still much less than women (>90%)
- Productivity gap also narrowing (in all 3 fields)...



Differences are shrinking



Conclusions

- ▶ Parenthood → vast majority [86-97%] of gender productivity gap

- ▶ Fathers do not systematically get a boost from parental leave

- ▶ Parental leave especially important to women (recruitment + retention)

- ▶ But important for *all parents* for work/life balance (80% of academics are parents! Fathers increasingly taking leave → the gap is closing)
- ▶ Only 64% of institutions offer any paid leave 
- ▶ We. Can. Do. Better.

Caveats:

We didn't ask about dual-career / relationship status.

Sample is current faculty only → may select for those who experience smaller productivity penalties (survivor bias)

Productivity is a crude measure of scholarship contributions

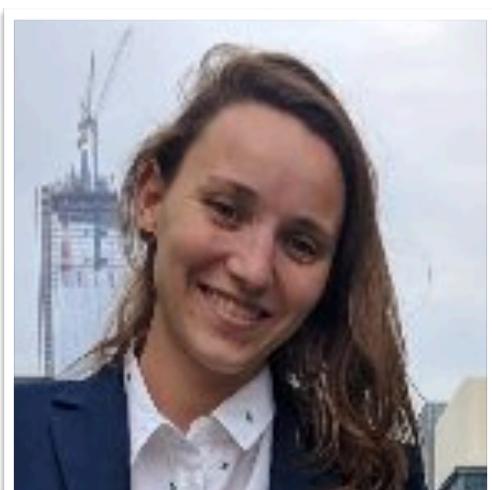


SCIENTIFIC COMMUNITY

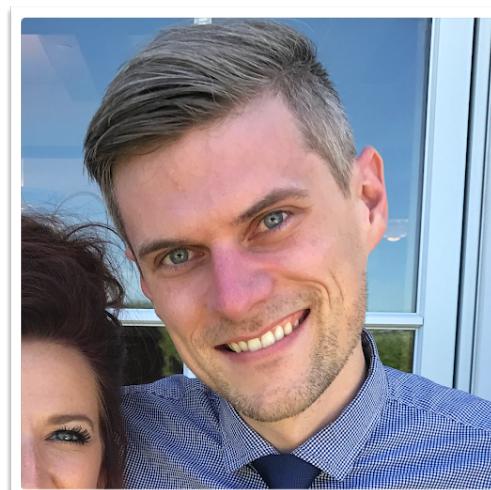
The unequal impact of parenthood in academia

Allison C. Morgan^{1,*}, Samuel F. Way¹, Michael J. D. Hoefer¹, Daniel B. Larremore^{1,2}, Mirta Galesic³, Aaron Clauset^{1,2,3*}

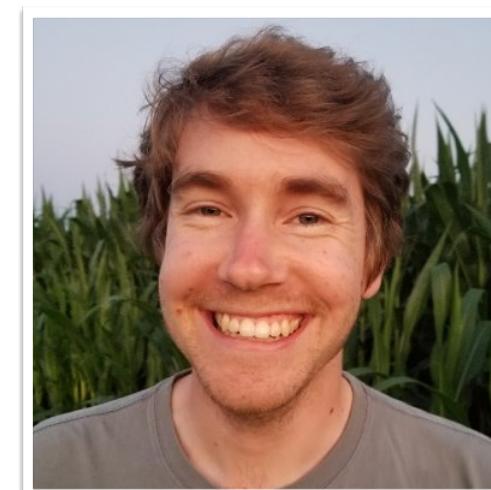
Across academia, men and women tend to publish at unequal rates. Existing explanations include the potentially unequal impact of parenthood on scholarship, but a lack of appropriate data has prevented its clear assessment. Here, we quantify the impact of parenthood on scholarship using an extensive survey of the timing of parenthood events, longitudinal publication data, and perceptions of research expectations among 3064 tenure-track faculty at 450 Ph.D.-granting computer science, history, and business departments across the United States and Canada, along with data on institution-specific parental leave policies. Parenthood explains most of the gender productivity gap by lowering the average short-term productivity of mothers, even as parents tend to be slightly more productive on average than nonparents. However, the size of productivity penalty for mothers appears to have shrunk over time. Women report that paid parental leave and adequate childcare are important factors in their recruitment and retention. These results have broad implications for efforts to improve the inclusiveness of scholarship.



Dr. Allison C Morgan
(Colorado)



Dr. Samuel F Way
(Colorado)



Michael J. D. Hoefer
(Colorado)



Prof. Mirta Galesic
(Santa Fe)



Prof. Daniel B Larremore
(Colorado)



Prof. Aaron Clauset
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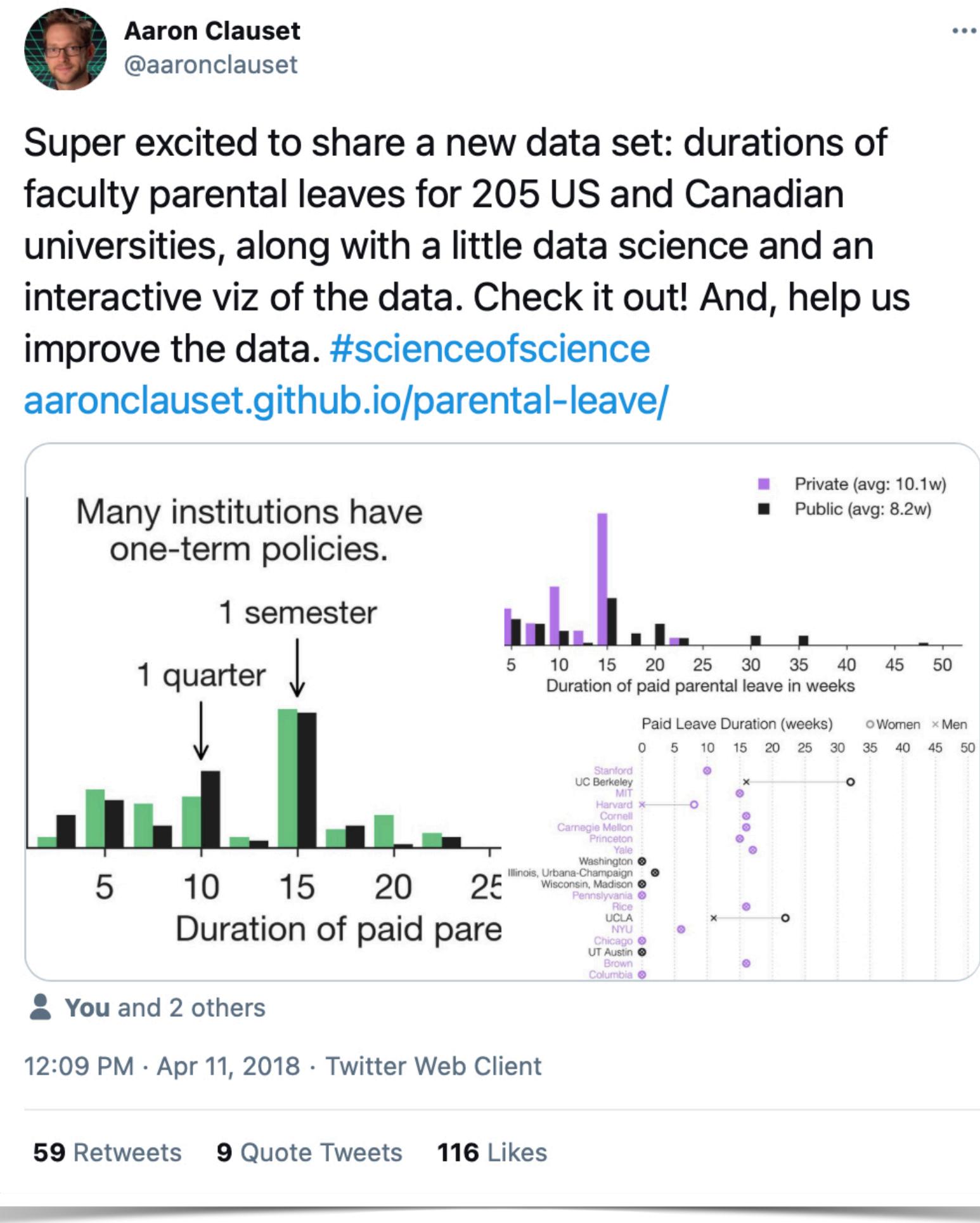


Funding:

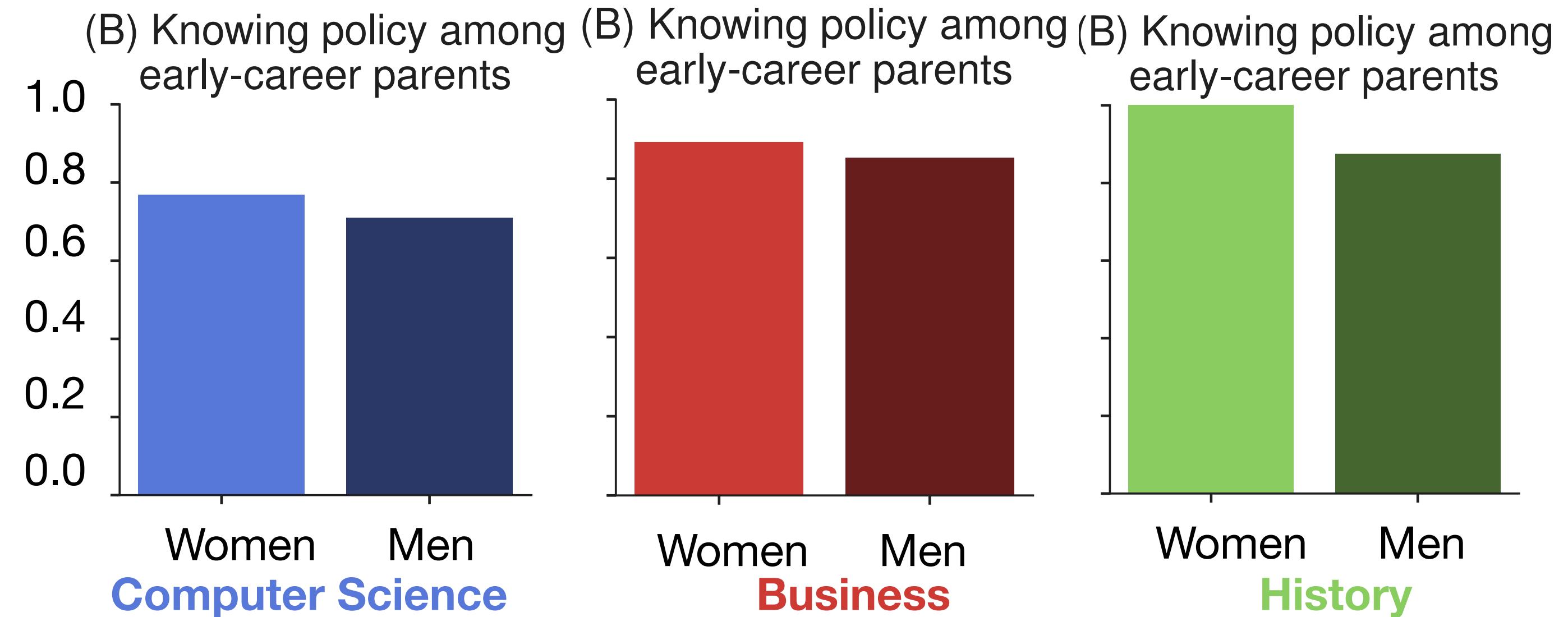
Fin

data & code: <https://github.com/allisonmorgan/parenthood>

Characteristic of parental leave policies



17% of early career faculty with children don't know what their institution's parental leave policy is!



Aside: Characteristic of parental leave policies

A faculty member who gives birth, or her spouse or Institute-registered domestic partner, if he/she is the child's primary care giver, may take a one-quarter leave without loss of salary or benefits within one year of the arrival of the child. Similarly, an adoptive parent who is the primary care giver may take a one-quarter leave without loss of salary or benefits within one year of the arrival of the child.

The primary care giver is the parent responsible for the majority of the child care.

Where both parents are members of the faculty, only one may seek parental leave at a time. The parental leave may be split between the two, but may not exceed one quarter total for the two.

The faculty member(s) should discuss his or her leave plans with the Chief Academic Officer a minimum of three months before the proposed leave.

Eligibility

- Applies to employees eligible for full benefits
- Intended to provide paid time off after the birth of a baby. If medical conditions arise prior to the birth, parental leave may be taken before the birth
- Includes adoption (primary caregiver) for children under 7 years old not attending school full-time. Employee must certify that they are the primary caregiver
- Must be taken within 12 months from the birth of the baby
- Runs concurrent with the Family Medical Leave Act (FMLA)

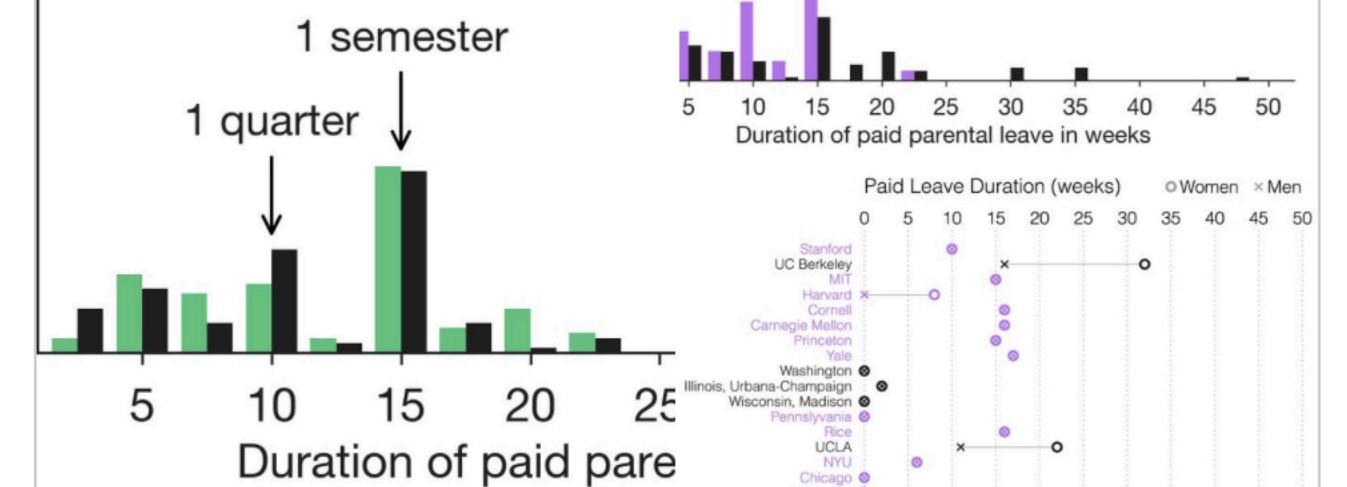
- b. The faculty member will receive pay at the rate of 95% of her or his annual base salary during that semester, unless the department or college chooses to supplement the salary above 95% (and any such supplementation must be applied consistently for all faculty members of that unit who take parental leave).



Aaron Clauset
@aaronclauset

Super excited to share a new data set: durations of faculty parental leaves for 205 US and Canadian universities, along with a little data science and an interactive viz of the data. Check it out! And, help us improve the data. #scienceofscience
aaronclauset.github.io/parental-leave/

Many institutions have one-term policies.



You and 2 others

12:09 PM · Apr 11, 2018 · Twitter Web Client

59 Retweets 9 Quote Tweets 116 Likes

<https://aaronclauset.github.io/parental-leave/>