

# **Conditional Parity-Specific Fertility Rates for the U.S.: New Measurements for State-Level Policy Assessment**



**Leslie Root<sup>1</sup>, Amanda Stevenson<sup>1,2</sup>, Katie Genadek<sup>1,3</sup>, Sara Yeatman<sup>1</sup>,  
Stefanie Mollborn<sup>1,2</sup>, Jane Menken<sup>1</sup>**

**<sup>1</sup>University of Colorado Population Center, Population Program, Institute of Behavioral Science**

**<sup>2</sup>University of Colorado Boulder Department of Sociology**

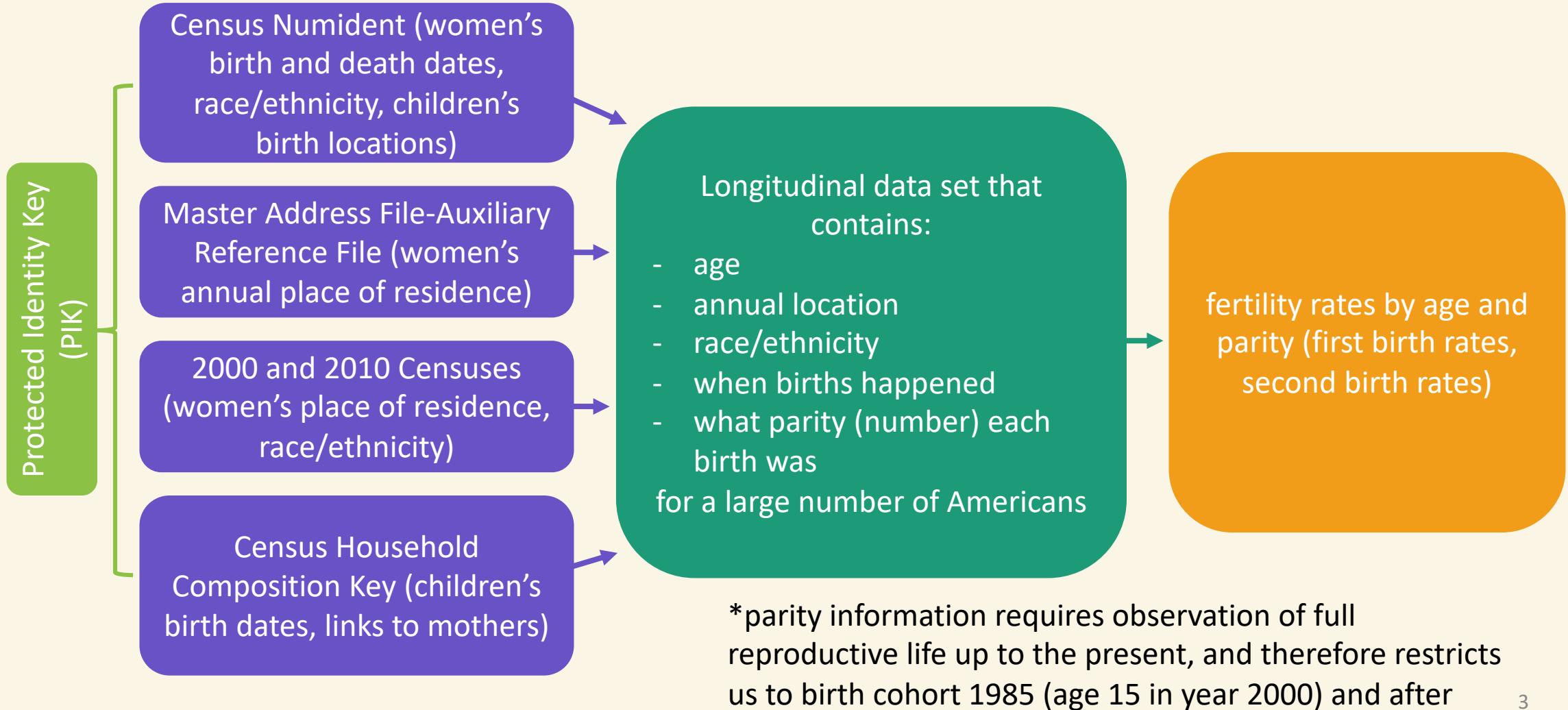
**<sup>3</sup>U.S. Census Bureau**

This research has benefited from the NICHD-funded University of Colorado Population Center (Project 2P2CHD066613-06) for research, administrative, and computing support. It was produced under the NICHD-funded grant R01 HD 101480, "Increased Access to Highly Effective Contraception: An Opportunity Dividend."

Any conclusions expressed herein are those of the authors and do not reflect the views of the U.S. Census Bureau. All results were approved for release by the Disclose Review Board of the U.S. Census Bureau (Data Management System number: P-7505458, Disclosure Review Board (DRB) approval number: CBDRB-FY23-ADEP001-002).

# **Part 1: Generating Conditional Parity-Specific Rates for Population Subgroups**

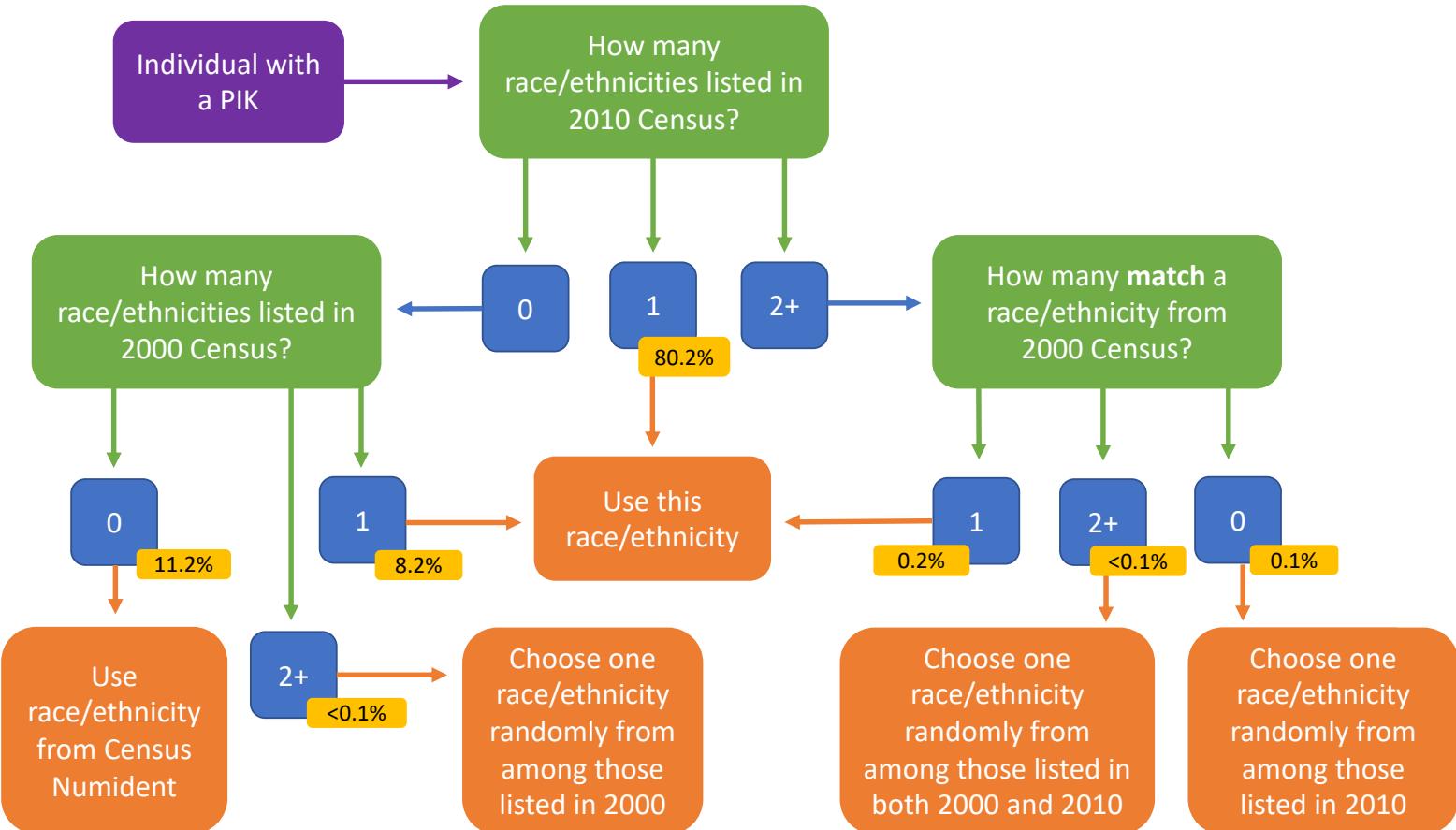
# Data



# Constructing Denominators

Census Numident	Master Address File - Auxiliary Reference File					Various sources
PIK, sex, birth and death dates	Location 2000	Location 2001	Location 2002	...	Location 2020	Race/ethnicity
9999991 F 01/01/89 NA	CA	CA	CA		CA	NH Asian
9999992 F 02/02/76 NA	IA	IA	IL		IL	Hispanic
9999993 F 03/15/91 NA	TX	.TX	TX		TX	Hispanic
9999994 F 04/01/01 NA	.	DC	MD		CO	NHB
9999995 F 11/11/81 10/16/01	FL	FL	.		.	NHW

# Assigning Race/Ethnicity



# Constructing Numerators

## Census Household Composition Key

- Probabilistically links parents to children by PIK, based on names and residential addresses
- Yearly files contain children aged 0-19; combining all years, very good coverage of births from 1999-2021
- Like denominator, restricted to those with Social Security Numbers – a limitation of our sample
- Parity subset: contains only births to women who are in the parity-restricted subset of the denominator; births are then ordered, and parity is assigned

# Longitudinal Data

PIK, sex, birth and death dates	Locations	Race/ethnicity	Birth 1	Age at birth 1	Birth 2	Age at birth 2
9999991 F 01/01/89 NA	...	NH Asian	2005	16	2018	28
9999992 F 02/02/76 NA	...	Hispanic	2012	36	NA	NA
9999993 F 03/15/91 NA	...	Hispanic	2018	27	2018	27
9999994 F 04/01/01 NA	...	NHB	NA	NA	NA	NA
9999995 F 11/11/81 10/16/01	...	NHW	1999	16	NA	NA

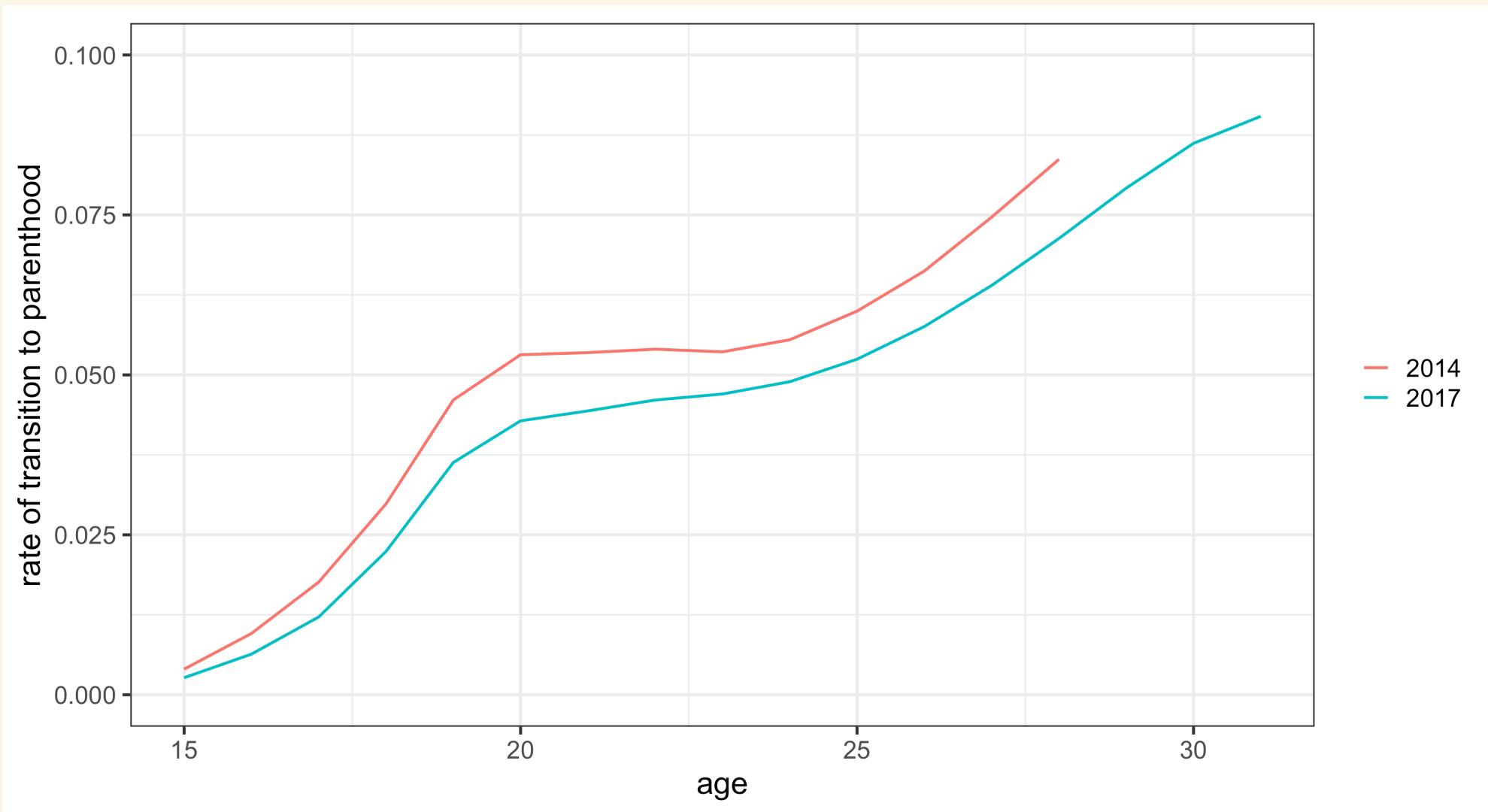
# Methods: Conditional Parity-Specific Rates

- Conditional ASFRs by parity, race/ethnicity and state:

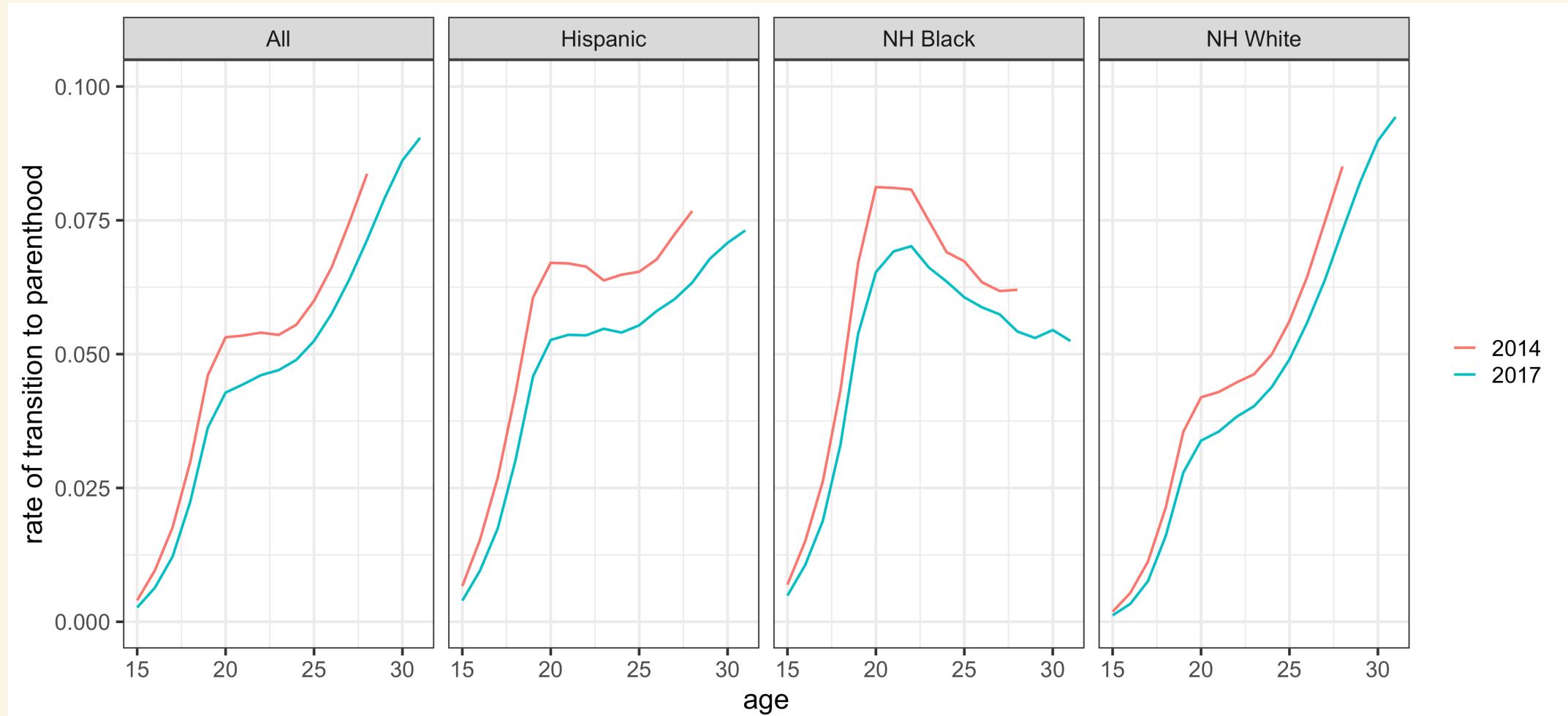
$$h_{xt}^{(p)} = B_{xt}^{(p)} / E_{xt}^{(p-1)}$$

- age  $x$  in 15+ (varies by year – includes anyone birth cohort 1985 or later)
- year  $t$  in 2000 to 2020
- parity  $p$  in 1 to 2

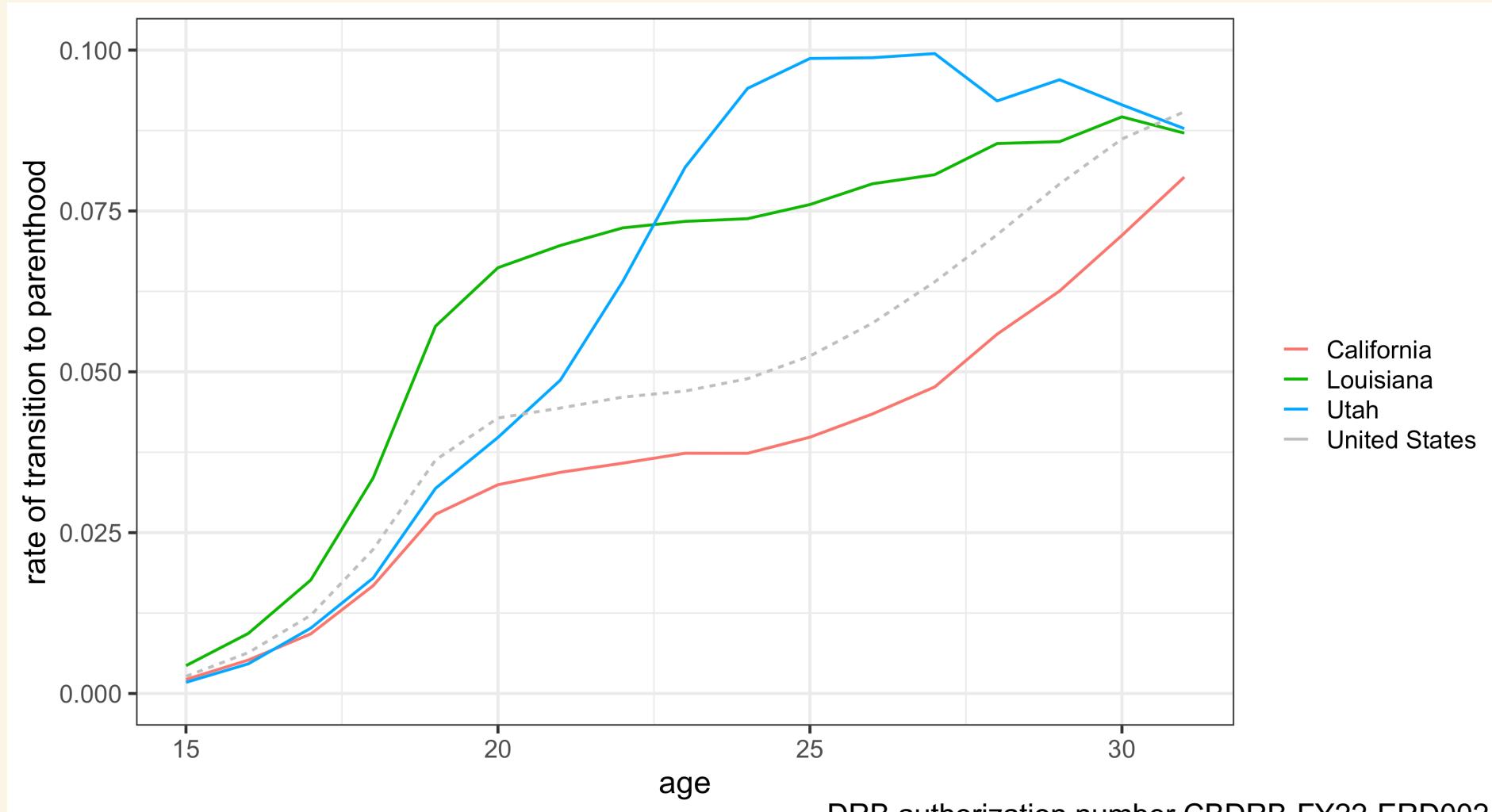
# Transition to Parenthood, 2014-2017



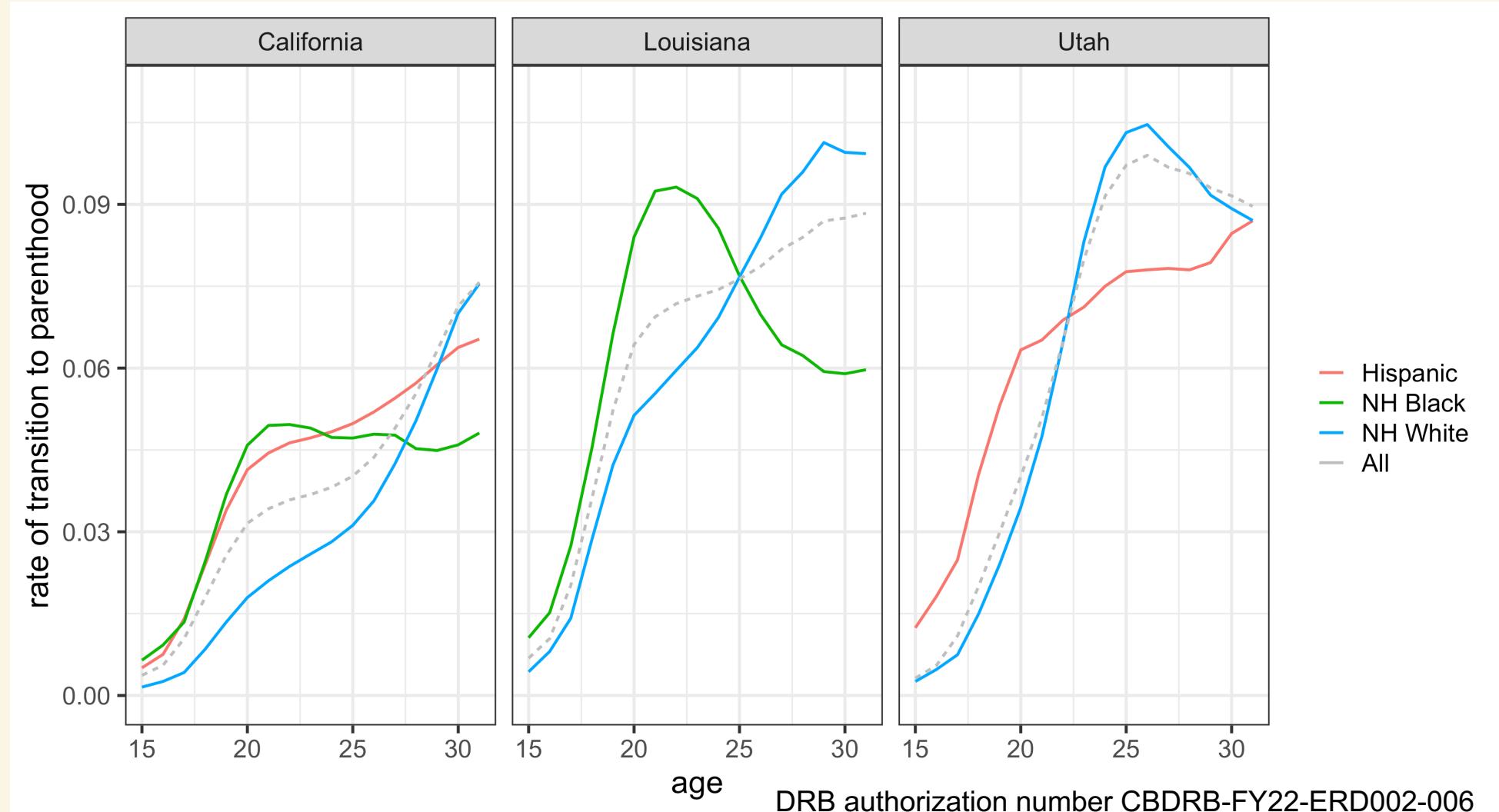
# Transition to Parenthood by Race/Ethnicity



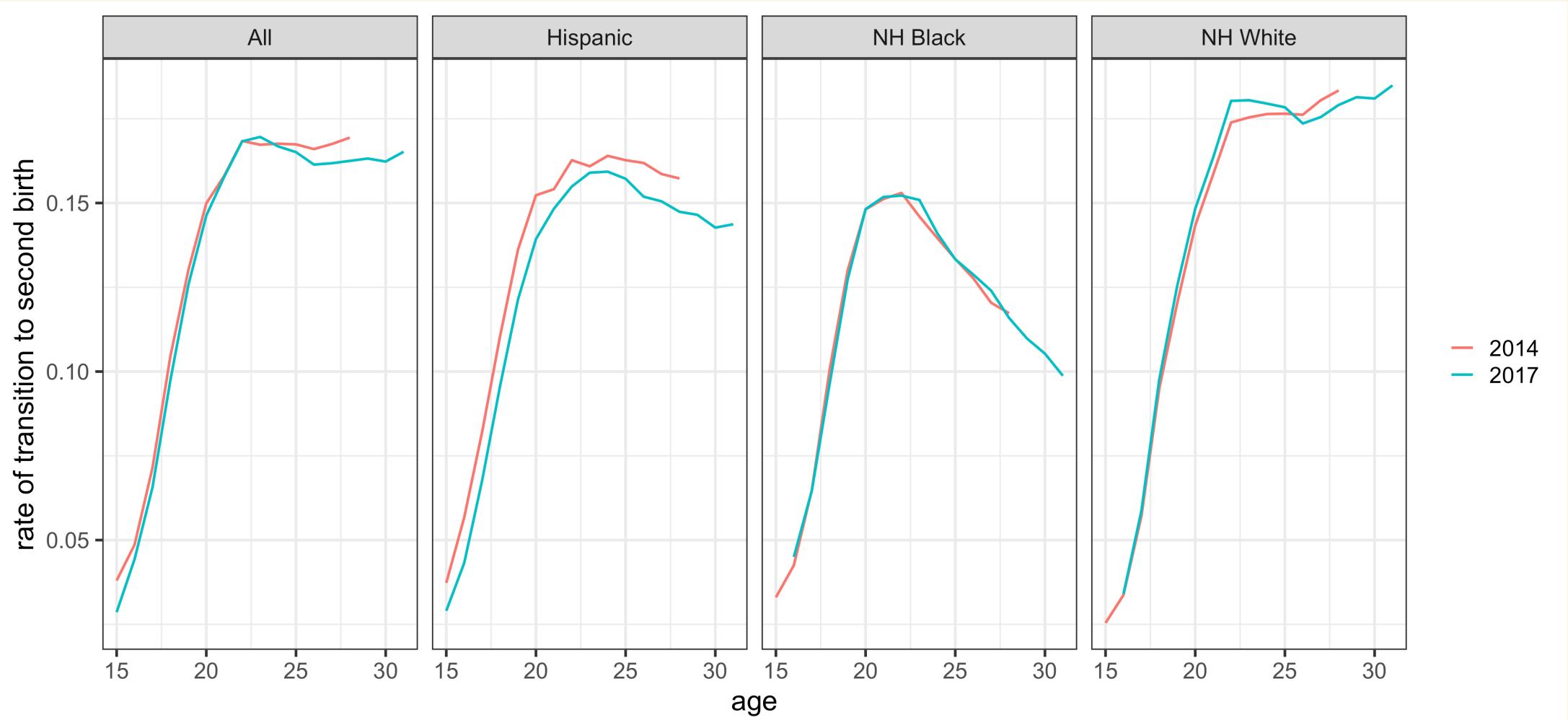
# Transition to Parenthood by State, 2017



# Transition to Parenthood by State and Race/Ethnicity, 2017



# Transition to Second Birth by Race/Ethnicity, 2014-2017



# **Part 2: State-Level Policy Assessment: the Fertility Effect of the Colorado Family Planning Initiative**

# Background and Motivation

- Colorado Family Planning Initiative (CFPI): Large intervention providing supplemental funds to CO Title X family planning clinics, 2009-2016
  - Title X: safety net family planning provider
  - CFPI allowed clinics to offer full range of contraceptive options to all patients
- Correlation with changes in method mix (Humphreys & Stevenson 2023)
- Correlation with declining teen birth rates (Lindo & Packham 2017, Kelly et al. 2020)
- Led to increases in high school and college completion (Stevenson et al. 2021, Yeatman et al. 2022)
- Effect on poverty (Stevenson et al. 2023)

# Background and Motivation

- Policy arguments for family planning often don't match the evidence we have
- Measuring fertility in its context is crucial to building good evidence
- Assessing effects:
  - statewide (not county-level)
  - for those who were older at program start (not just teens)
  - in later years (2011-2020)
  - Heterogeneity by race/ethnicity – differences in demand and utilization, access to health care
  - Heterogeneity by parity – proportion of fertility desired/well-timed will vary by both age and parity

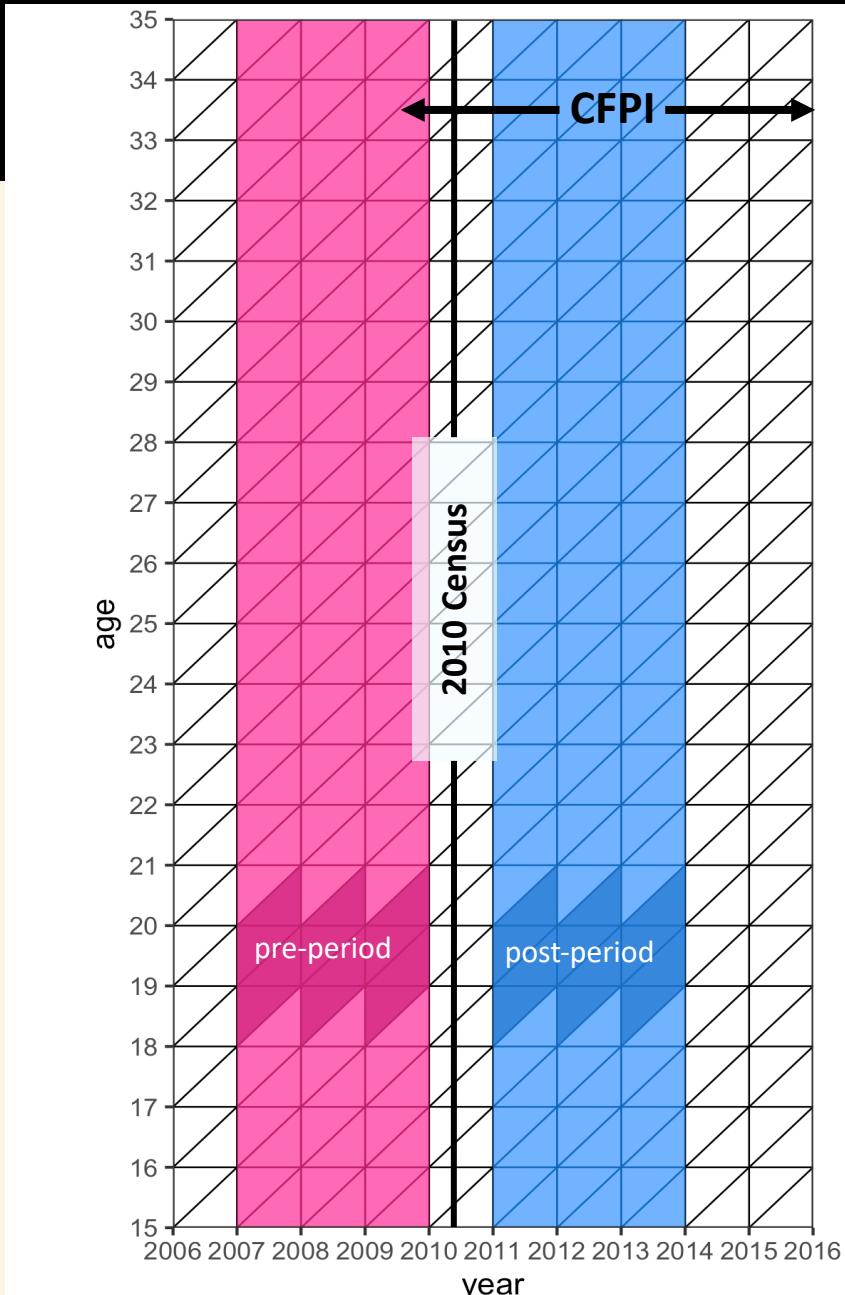
# Method

## Difference-in-differences

$$\begin{aligned} \text{logit}[\text{prob}(b_{iy} = 1)] \\ = \alpha_0 + \alpha_1 CO_i + \alpha_2 P_i + \alpha_3 CO_i P_i + \varepsilon_i \end{aligned}$$

First difference: change in period ASFR from **pre-** to **post-**

Second difference: difference in that change between **treated** group and **non-treated** group



# Selecting comparison places

- Age/period/cohort problem
  - we know fertility is strongly patterned by age, but which of the other two matters more?
  - if period effect: select same comparison place across all age groups
  - if cohort effect: select separate comparison places by age group
  - And what does this mean for thinking about how trends in pre-period are meaningfully related to those in post-period?
- Current (first) approach:
  - prioritize period: match on entire pre-period ASFR curve

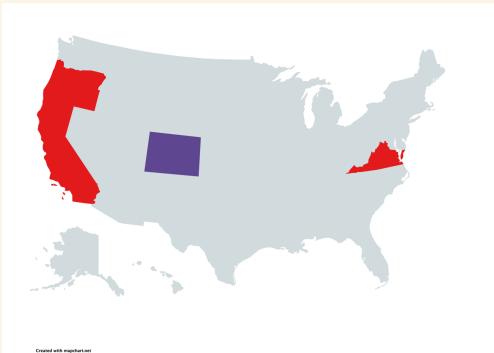
# Selecting comparison states

- Setup:
  - populations defined by location at 2010 Census
  - pre-period: 2007-2009
  - select comparison states separately by race/ethnicity (all, Hispanic, non-Hispanic white)
- Identification: Parameterization of ASFR curves (cf. Schmertmann 2003, Flynn & Stevenson 2022)
- Score similarity of parameterized curves to Colorado parameterized curves over pre-period

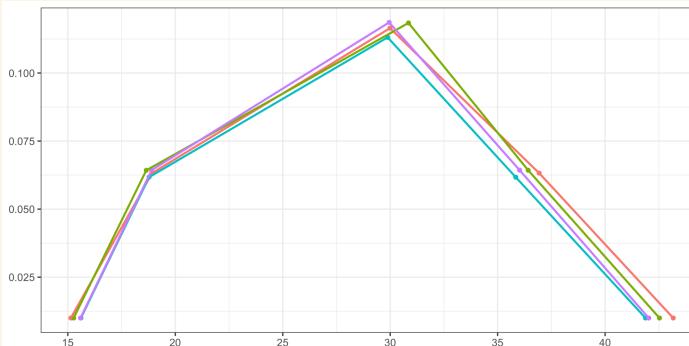
## Race/ethnicity

## Comparison states

all races/  
ethnicities

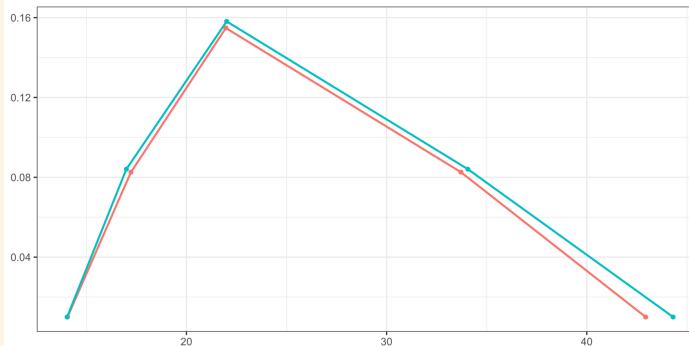
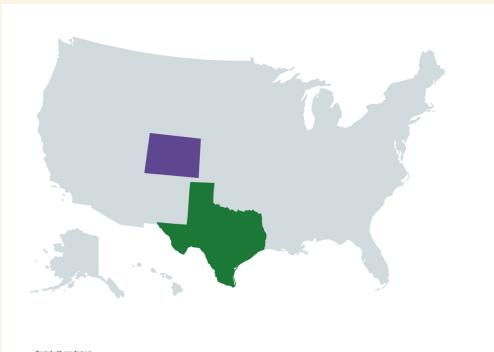


**Parameterized ASFR curves**  
for Colorado and comparison states

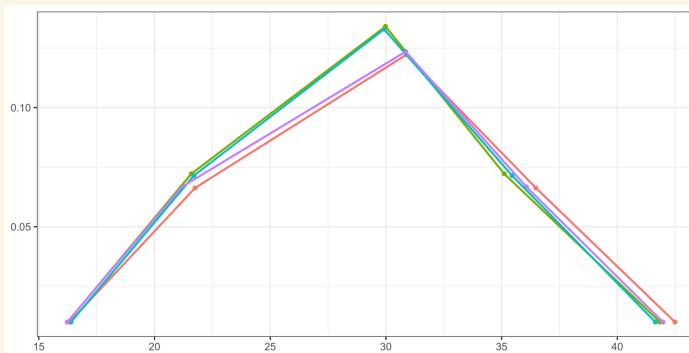
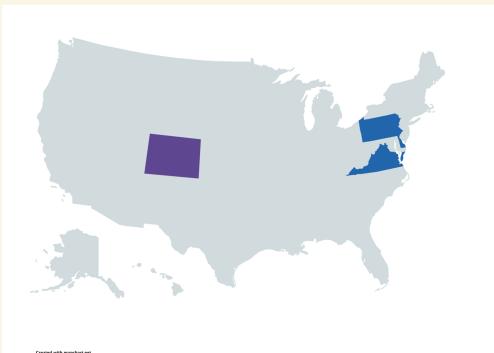


**Sample size** (Women born 1961-1997 and resident at 2010 Census)

Hispanic



non-Hispanic  
white

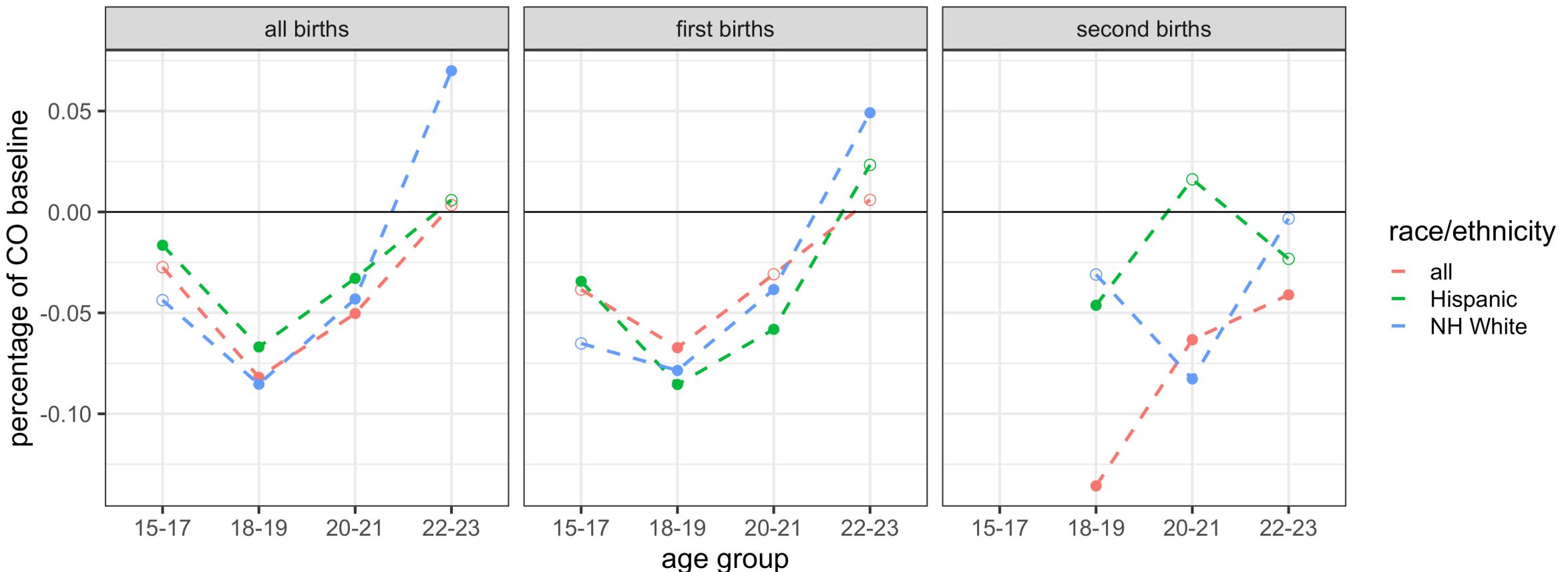


Colorado	Texas
202,000	1,931,000

Colorado	Delaware, Pennsylvania, Virginia
753,000	3,356,000

# Results: change in fertility from 2007-2009 to 2011-2013

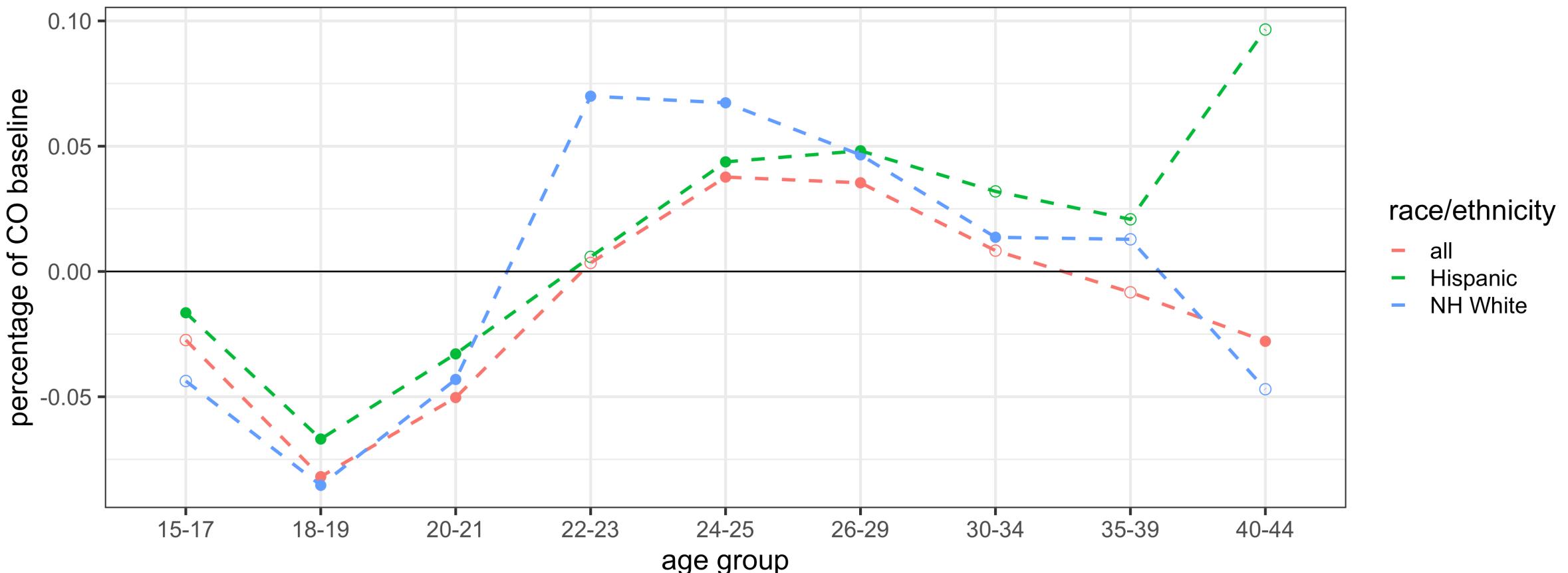
Point estimates of the causal effect of CFPI on fertility  
as a percentage-point change in baseline fertility



\*solid points indicate statistically significant ( $p < .05$ ) results; open points are not statistically significant

# Results: change in fertility from 2007-2009 to 2011-2013

Point estimates of the causal effect of CFPI on fertility  
as a percentage-point change in baseline fertility



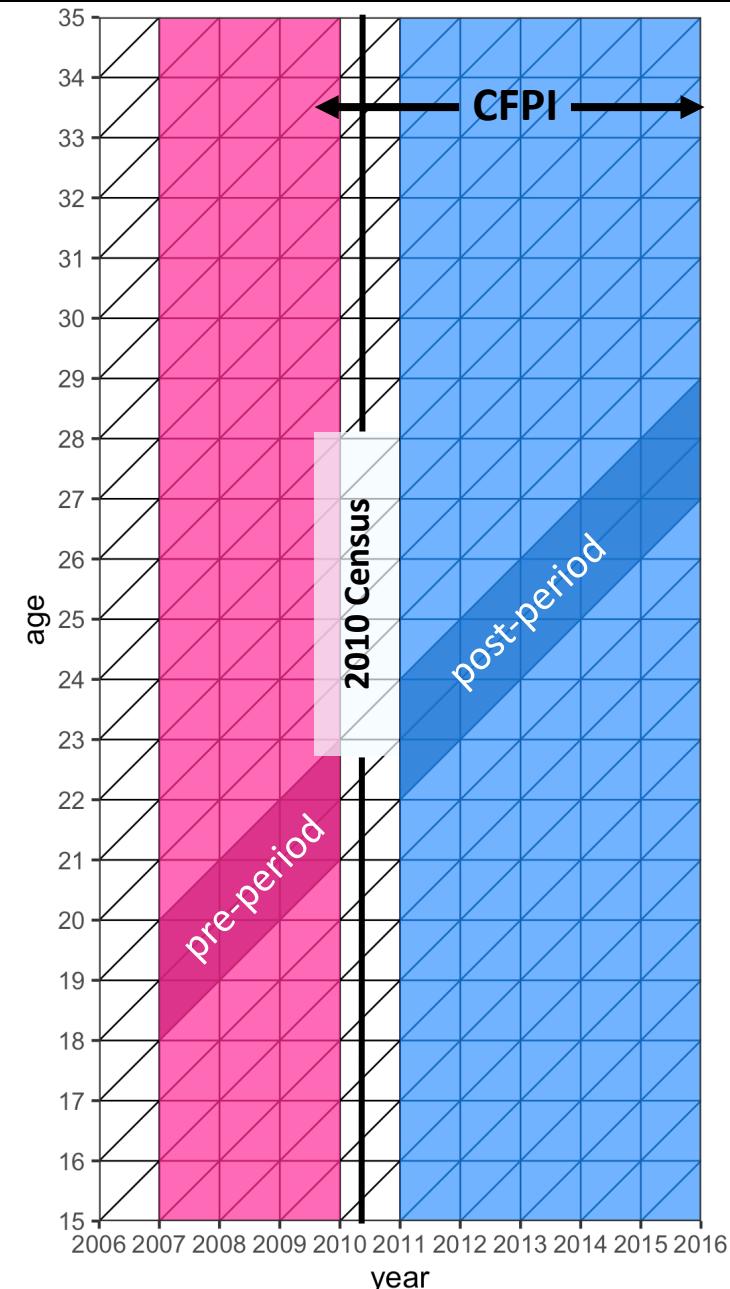
\*solid points indicate statistically significant ( $p < .05$ ) results; open points are not statistically significant

# Summary

- At young ages, rates of all births, and rates of first and second births considered separately, declined more among those exposed to CFPI than among those in comparison states
- Greatest percentage-point declines for 18- and 19-year-olds
- Trends similar for non-Hispanic white and Hispanic groups
  - Surprising, given greater program use by Hispanic population, and findings from Stevenson et al. (2021) and Yeatman et al. (2022) showing larger educational effects among Hispanic Coloradans
- At older ages (22+), no effect, and sometimes larger declines in comparison states

# Future Work

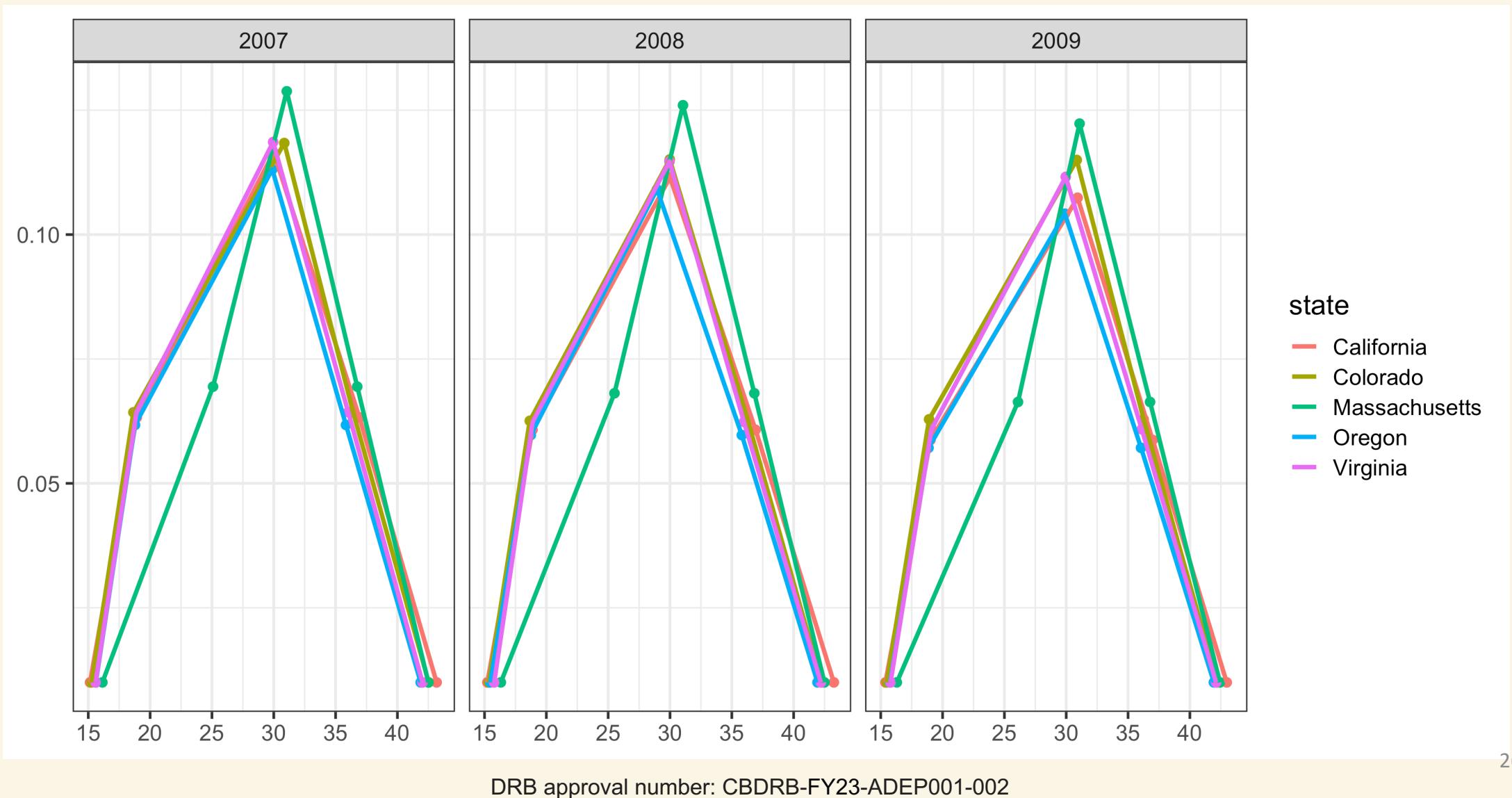
- Alternative specifications
  - definition of treatment
  - model incorporating duration in Colorado
  - synthetic control
  - separate selection of comparison states by age group
  - cohort approaches – DID, event history model
  - longer post-treatment period
- Incorporating poverty
  - using tax data for poverty status in family of origin and/or at program start



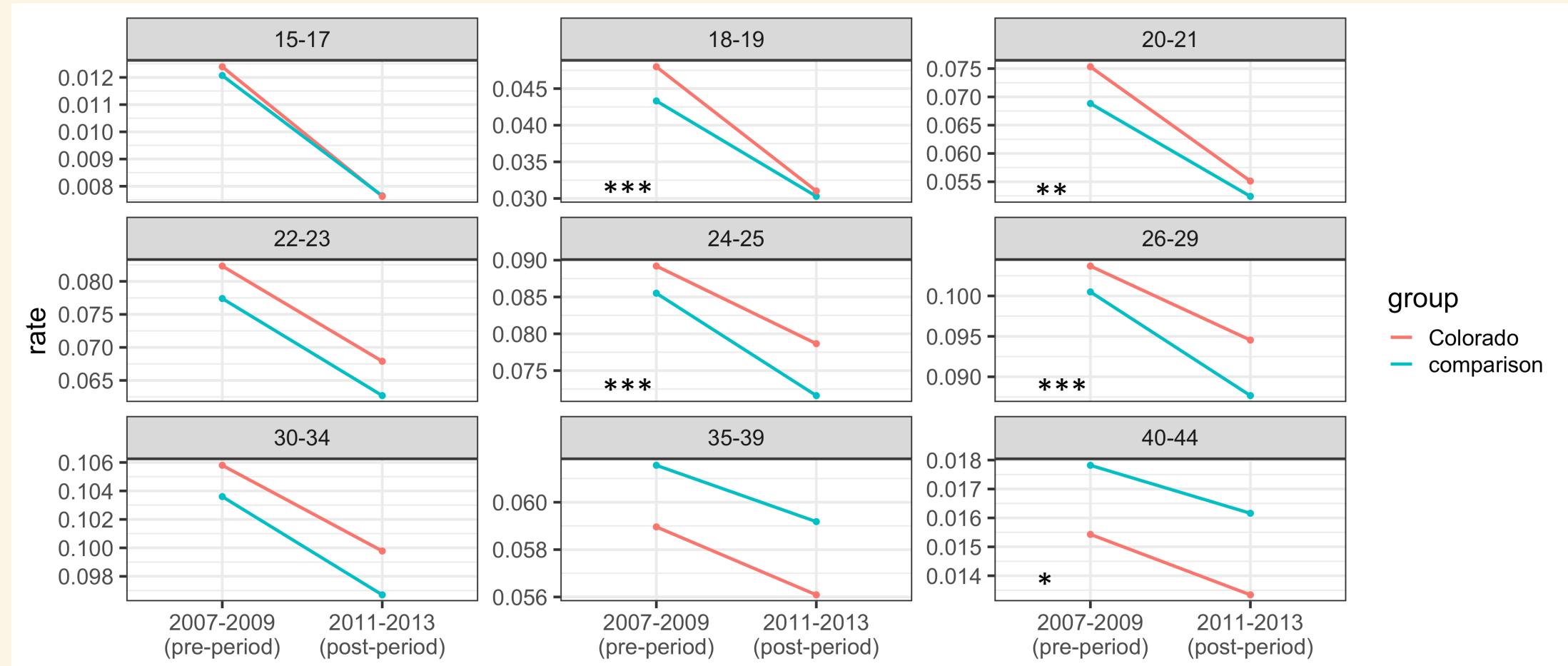
# Works Cited

- Flynn, James, and Amanda J. Stevenson. 2022. "A Parameterization to Describe Change in Modern US Fertility Schedules." Atlanta, Georgia.
- Humphreys, Abigail, and Amanda J. Stevenson. 2023. "Changes in Contraceptive Use Following the Colorado Family Planning Initiative." New Orleans.
- Kelly, Andrea, Jason M. Lindo, and Analisa Packham. 2020. "The Power of the IUD: Effects of Expanding Access to Contraception through Title X Clinics." *Journal of Public Economics* 192:104288. doi: [10.1016/j.jpubeco.2020.104288](https://doi.org/10.1016/j.jpubeco.2020.104288).
- Lindo, Jason M., and Analisa Packham. 2017. "How Much Can Expanding Access to Long-Acting Reversible Contraceptives Reduce Teen Birth Rates?" *American Economic Journal: Economic Policy* 9(3):348–76. doi: [10.1257/pol.20160039](https://doi.org/10.1257/pol.20160039).
- Schmertmann, Carl. 2003. "A System of Model Fertility Schedules with Graphically Intuitive Parameters." *Demographic Research* 9(5):81–110. doi: [10.4054/DemRes.2003.9.5](https://doi.org/10.4054/DemRes.2003.9.5).
- Stevenson, Amanda J., Katie R. Genadek, Sara Yeatman, Stefanie Mollborn, and Jane A. Menken. 2021. "The Impact of Contraceptive Access on High School Graduation." *Science Advances* 7(19):eabf6732. doi: [10.1126/sciadv.abf6732](https://doi.org/10.1126/sciadv.abf6732).
- Yeatman, Sara, James M. Flynn, Amanda Stevenson, Katie Genadek, Stefanie Mollborn, and Jane Menken. 2022. "Expanded Contraceptive Access Linked To Increase In College Completion Among Women In Colorado." *Health Affairs* 41(12):1754–62. doi: [10.1377/hlthaff.2022.00066](https://doi.org/10.1377/hlthaff.2022.00066).

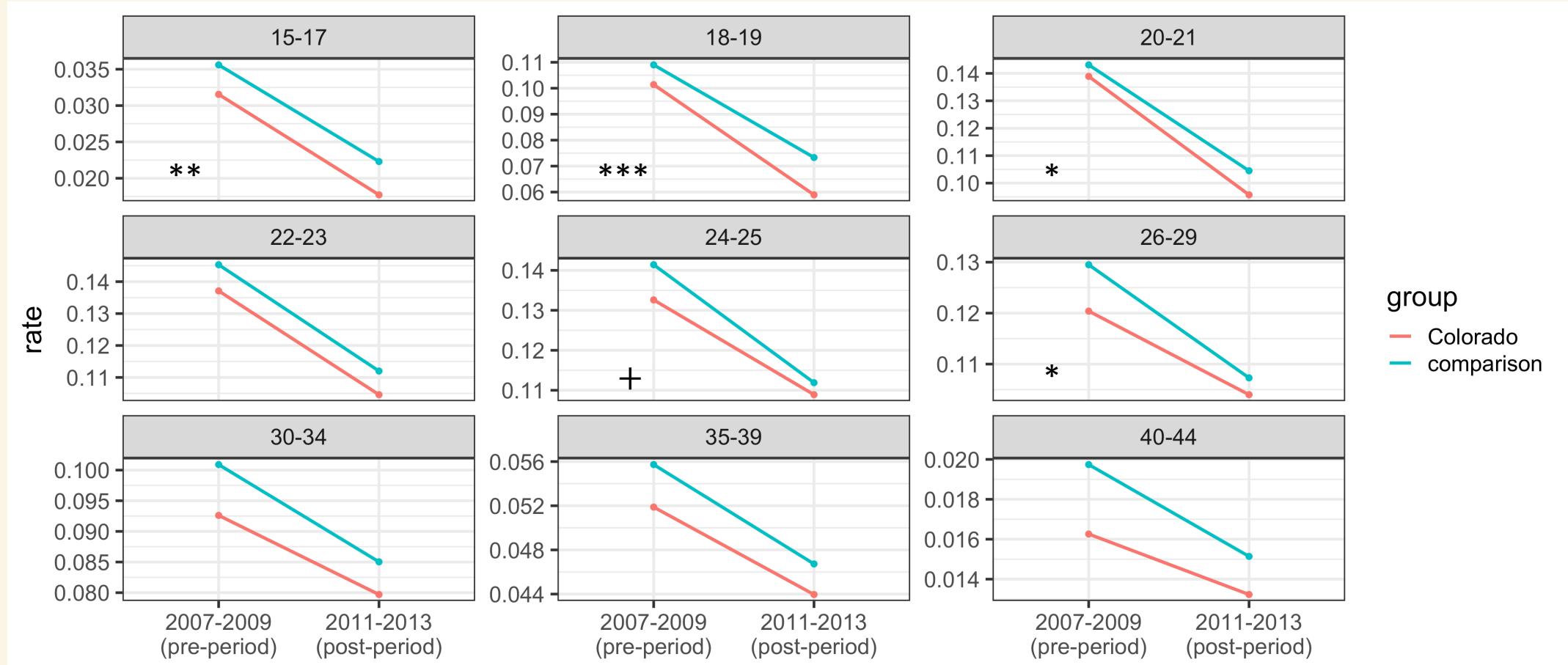
# Appendix: parameterization



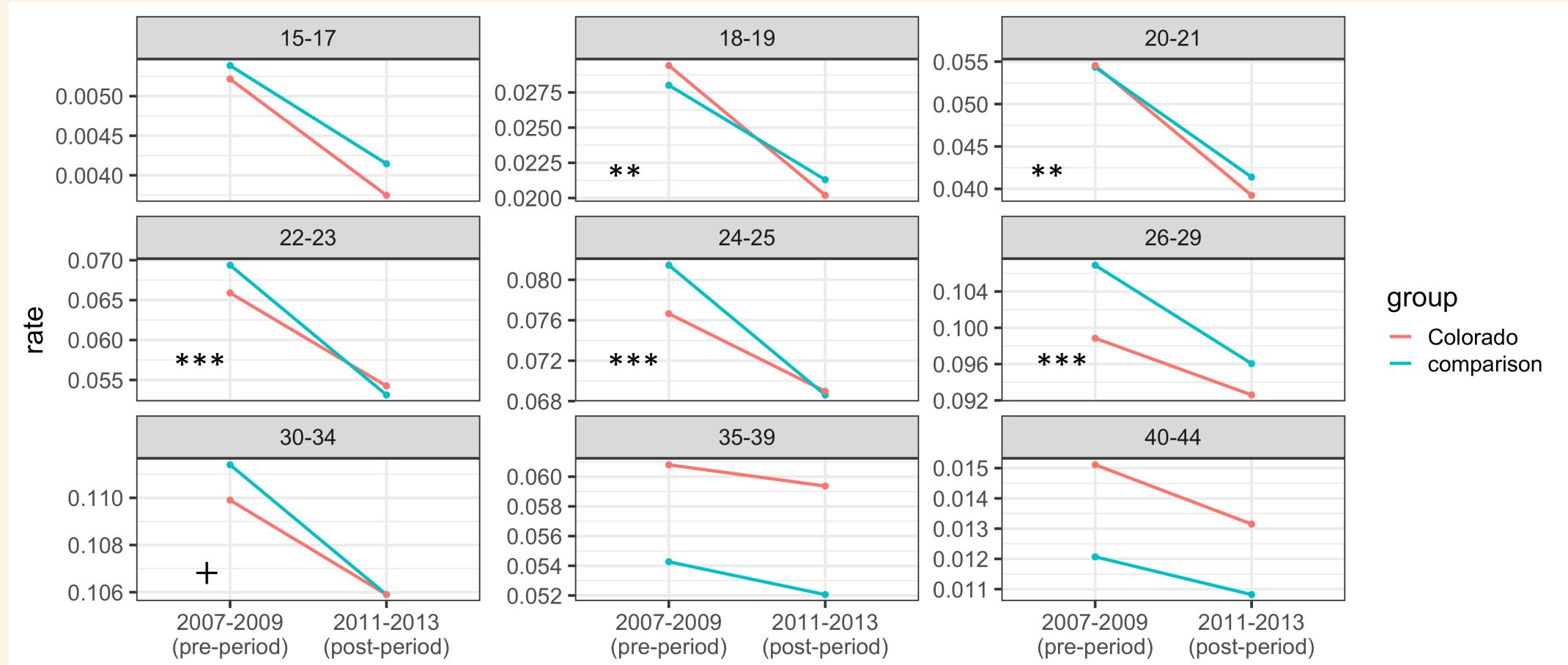
# Appendix: all race/ethnicities, births of all parities



# Appendix: Hispanic, births of all parities

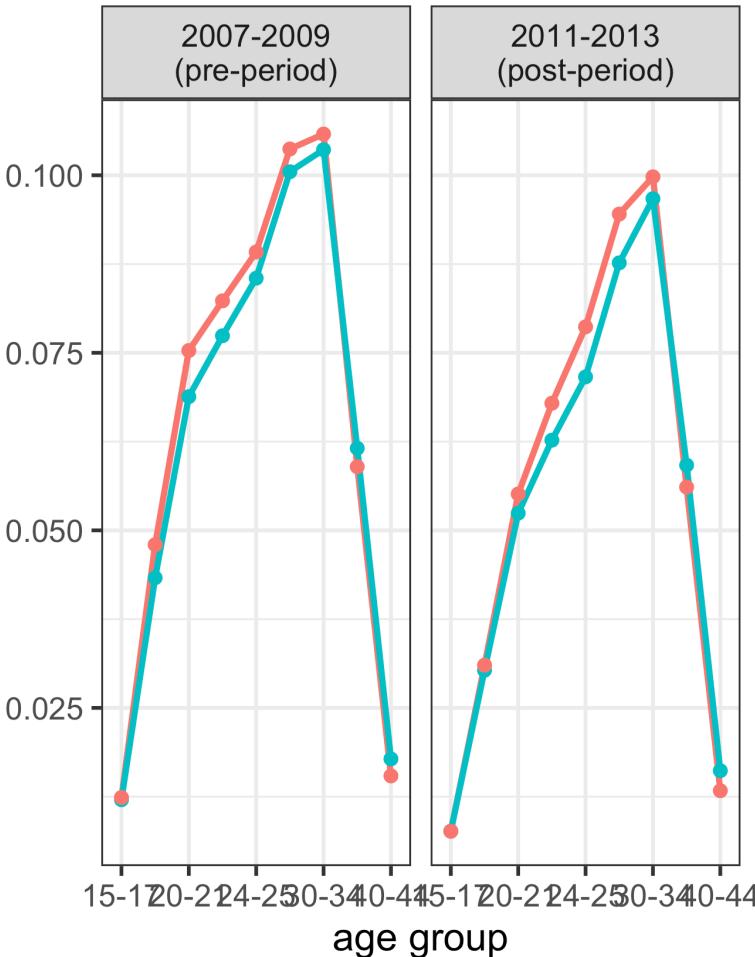


# Appendix: Non-Hispanic white, births of all parities

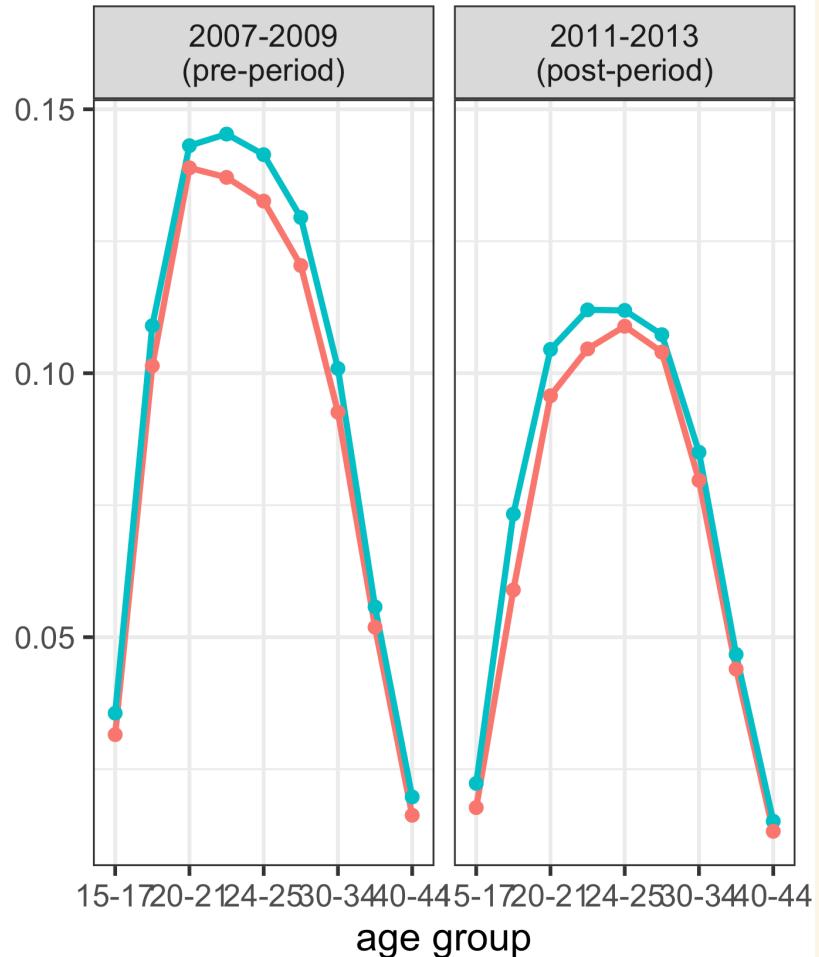


# Appendix: rate plots, births of all parities

All



Hispanic



Non-Hispanic white

