Field of Study and Future Fertility

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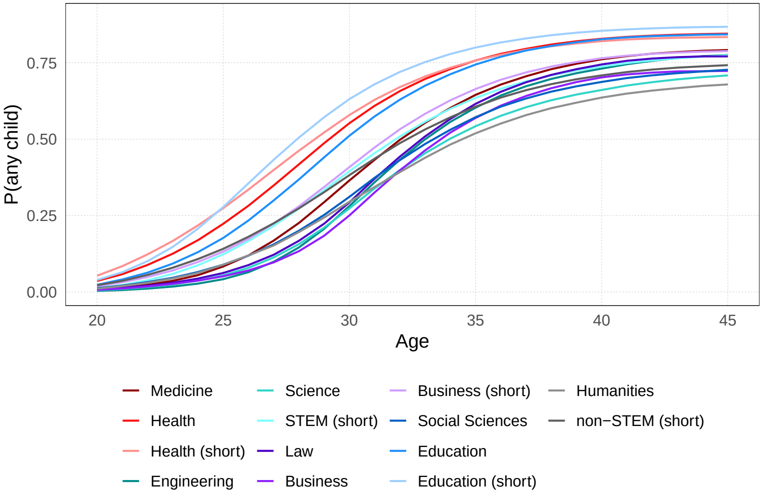
Motivation

- Fertility rates have been declining globally, with profound implications
  (Harper, 2014; Doepke et al., 2023; Bloom et al., 2023; Kearney and Levine, 2025)
- Education shapes key drivers of fertility decisions:
  wages, opportunity costs, career disruption, work schedules, partners
  (Goldin, 2014; Kearney et al., 2022; Kearney and Levine, 2022; Goldin et al., 2024)
- Large differences in fertility by field of study
  - Larger than gaps between education levels (Lappegård and Rønsen, 2005; Hoem et al., 2006)
  - Likely driven by preferences, anticipated constraints, and causal effect
- Research questions:
  - Are observed field-specific fertility gaps causal or due to selection? (today)
  - What are the mechanisms driving these causal effects? (in progress)
    income effects and “greedy”/inflexible work
    (Goldin, 2014, 2021; Cortés and Pan, 2019; Adda et al., 2017; Eckstein et al., 2019; Campos et al., 2026)
    partners who step in: matching, resources, and leave-taking (Goldin, 2026)

Education-Field-Fertility Gradient in Sweden



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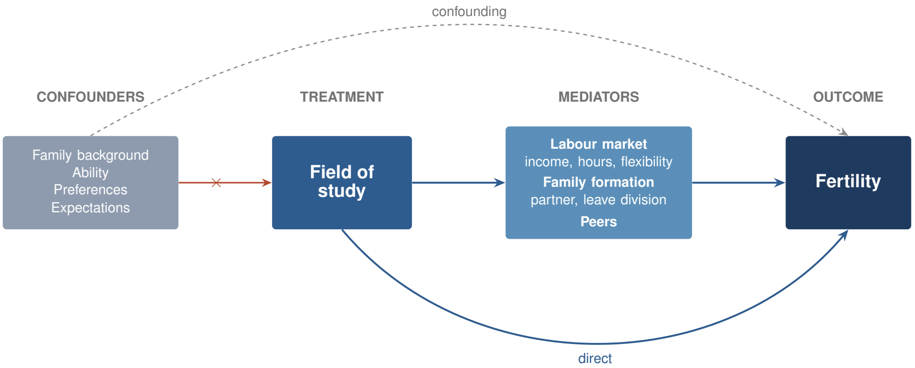
Confounders and Mediators



This paper

- Study fertility gaps in Sweden
- Link college admissions data to birth, household composition, education, and labor market registers
  - ▷ Students rank school and program pairs in college application
  - ▷ Admissions are mainly determined by high school GPA or scholastic aptitude test scores (SweSAT)
- Regression discontinuity design (RDD): use admissions GPA/test thresholds
  - ▷ Compare preferred program to next-best program
  - ▷ Has been used to estimate causal effect of college field on:
    - labor market outcomes: income (Kirkebøen, Leuven & Mogstad, 2016; Altmejd, 2021; Heinesen, Hvid, Kirkebøen, Leuven & Mogstad, 2023)
    - assortative mating in the marriage market (Kirkebøen, Leuven, Mogstad & Mountjoy, 2025)
- Preview of results:
  - ▷ Labor market: Significant changes in terms of income and schedule regularity for some fields
  - ▷ Fertility, short-term: some fields shift the timing of entering parenthood
  - ▷ Fertility, long-term: more muted effects

Literature

- **Effects of education level on fertility**:
  - School entry policies and compulsory schooling laws

    Black et al. (2008); Monstad et al. (2008); McCrary & Royer (2011); Silles (2011); Cygan-Rehm & Maeder (2013); Fort et al. (2016); Geruso & Royer (2018); Cummins (2022); Chen & Guo (2022)
  - Post-secondary and tertiary education reforms Grönqvist & Hall (2013), Humlum, Kristoffersen & Vejlin (2017), Virtanen, Silliman, Kuuppelomäki & Huttunen (2024); Currie & Moretti (2003)
- **Field of study and fertility**:
  - Field is stronger predictor than education level for childlessness

    Lappegård & Rønsen (2005); Hoem et al. (2006)
  - Payoffs of field of study and gender gaps

    Campos, Muñoz, Bucarey & Contreras (2026)
- **Effects of college selectivity and elite programs on fertility**:
  - Mixed evidence on fertility impacts of more selective school and elite programs

    Ge, Isaac & Miller (2022); Razavi (2024); Barrios Fernández et al. (2024); Kaufmann et al. (2021)
  - Temporary? fertility delays during women's early elite careers (Kirkebøen et al., 2025)
- **Income and wealth effects on fertility**:
  - Exogenous income shocks—lottery wins and unconditional transfers—little effect on fertility

    Cesarini, Lindqvist, Östling & Terskaya (2026); Krause, Rhodes, Miller, Bartik, Broockman & Vivalt (2026)

DATA AND INSTITUTIONAL DETAILS

Institutional details

- "Family-friendly" policies to help balance children and careers in Sweden
  - Generous paid parental leave since 1974, shared by both parents:
    - About 80% wage replacement, given prior employment and income
    - 450 days per child, 480 since 2002
    - Non-transferable months per parent: one 1995, two 2002, three 2016
    - Fathers' share of paid days: ≈10% mid-1990s, 32% in 2024

    (Ekberg, Eriksson & Friebel, 2013; Försäkringskassan, 2024)
  - Childcare highly subsidized, universal, highly utilized
  - Compulsory schooling and child health care free of charge

- Tertiary education in Sweden
  - Tuition-free, public, universal student grants and subsidized student loans
  - Centralized application
  - Application by ordered lists of max 12 school-program combinations
  - Admission by *admission group* score (GPA, SweSAT)
  - Truncated multicategory serial dictatorship[1]

[1] Not strategy proof, but minimally manipulable (Balinski and Sönmez 1999; Pathak and Sönmez 2013)

Data

- Application records from the national admission system, 1977–2005
  - Ranked choices, admission-group scores, admission outcomes
  - $\approx$1.1 million pair-observations across $\approx$53,000 admission cutoffs
- Education registers: enrollment spells and degrees
  - 14 fields: long ($\geq$ 4-yr) and short ($\leq$ 3-yr) programs
- Registers linked by personal identifier
  - Births: Medical Birth Register, children linked to both parents
  - Labor: LISA 1990–2023, earnings and occupation
  - Occupation characteristics via O*NET: work hours, flexibility, schedule
  - Partners: married and cohabiting couples with common children
  - Conscription tests (men): cognitive and noncognitive skills

EMPIRICAL STRATEGY

Empirical Strategy

- **Constructing Preferred and Next-best Fields**
  - College applications collapsed by admission groups, fields
  - Dominated alternatives removed
  - Pairs of **preferred** j and **next-best** k field with possibly two pairs per applicant
- Example: consider applicant with score=8

	cutoff	result
1. Electrical Engineering	9	below
2. Medicine	10	below
3. Economics	8	admitted
4. Politics	7	withdrawn
5. Teaching	6	withdrawn

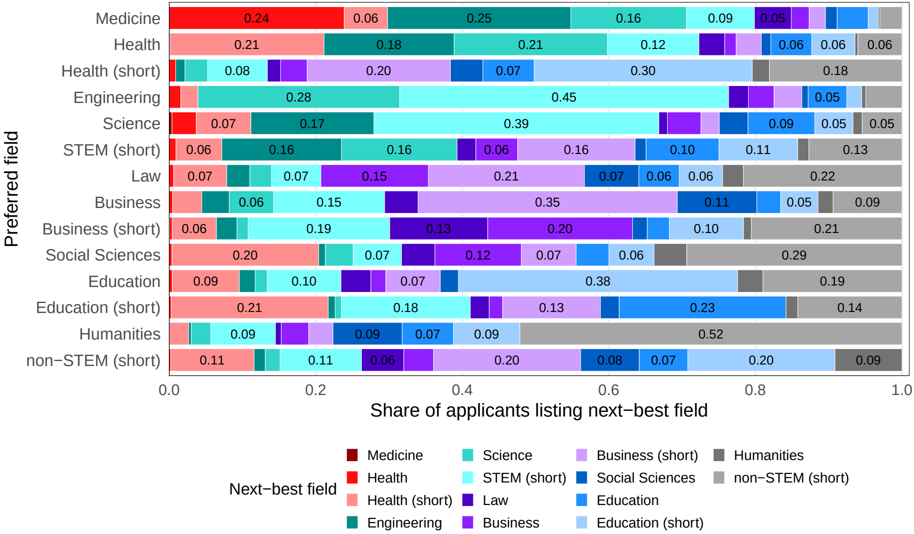
Remove Dominated Choices

	cutoff	result
1. Electrical Engineering	9	below
~~2. Medicine~~	~~10~~	~~below~~
3. Economics	8	admitted
4. Politics	7	withdrawn
5. Teaching	6	withdrawn

Group programs
And select two pairs

	cutoff	result
1. Engineering	9	below
3-4. Social Sciences	7	admitted
5. Teaching	6	withdrawn

Preferred Field and Share of Applicants listing each Next-best Field



▸ incl. No College

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Empirical Strategy

First Stage:

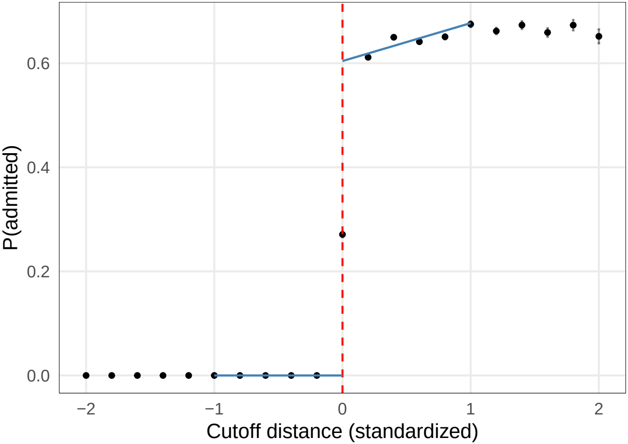
$$\text{Enrolled}_{ijkt} = \sum_{f} \alpha_f \cdot \text{Above}_{ijt} \cdot \mathbf{1}\left[\text{field}_j = f\right] + \gamma^1_{jk} + \delta^1_t + g^1_q\left(d_{ijt}\right) + \varepsilon_{ijkt}$$

Second Stage (IV):

$$Y_{ijkt} = \sum_{f} \beta_f \cdot \widehat{\text{Enrolled}}_{ijkt} \cdot \mathbf{1}\left[\text{field}_j = f\right] + \gamma^2_{jk} + \delta^2_t + g^2_q\left(d_{ijt}\right) + \nu_{ijkt}$$

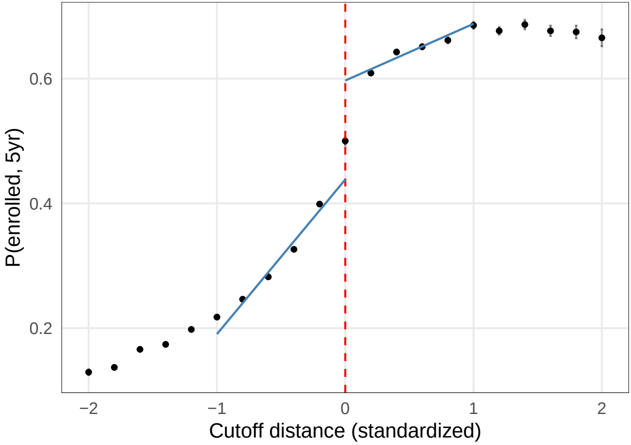
- d_{ijt}: standardized distance from cutoff j; $\text{Above}_{ijt} = \mathbf{1}\left[d_{ijt} \geq 0\right]$
- γ^{stage}_{jk}: field-pair FE (preferred $j \times$ counterfactual k); δ^{stage}_t: application-year FE; priority-bin FE
- $g^{stage}_q(d) = \sum_{g=1}^{15} \mathbf{1}\left[i \in G_g\right]\left(\mu^{stage}_g + \beta^{stage}_g d + \lambda^{stage}_g \cdot \text{Above} \cdot d\right)$,
  where G_g are cutoff-selectivity quintiles $\times$ application priority (1, 2, 3+)
- Bandwidth: $|d| < 2.0$
- SE clustered at individual level
- **Sample:** applicants 1977–2005, age $\leq$ 23, no children in the year before applying

First Stage: Regression discontinuity plots for College Admission



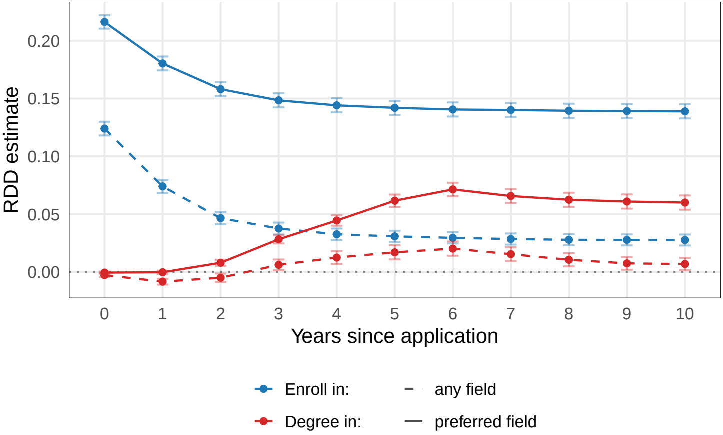
- 61 p.p. increase in probability of admission to preferred field at cut-off
- range from 78 p.p. for Medicine to 47 p.p. for non-STEM (short)

First Stage: Regression discontinuity plots for College Enrollment (5 years)



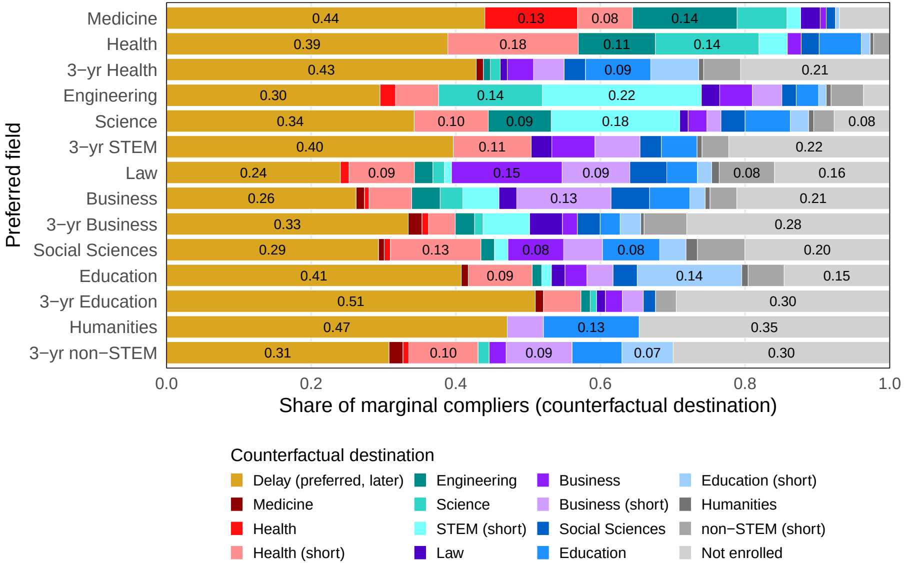
- 15 p.p. increase in probability of enrollment in preferred field at cut-off
- range from 31 p.p. for Medicine to 3 p.p. for Humanities (all 14 field estimates significant)

First Stage: Dynamics of Enrollment and Degrees



- Small impact on “extensive margin” of college enrollment and graduation ($\approx$ 2 p.p.)
- Larger impact on “intensive margin” of enrollment and graduation in preferred field

Effective Next Best: Where Marginal Applicants Go Instead (Women)



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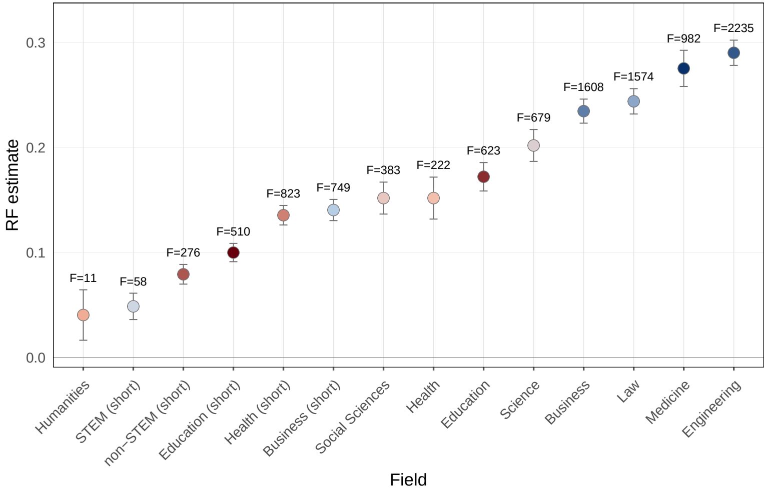
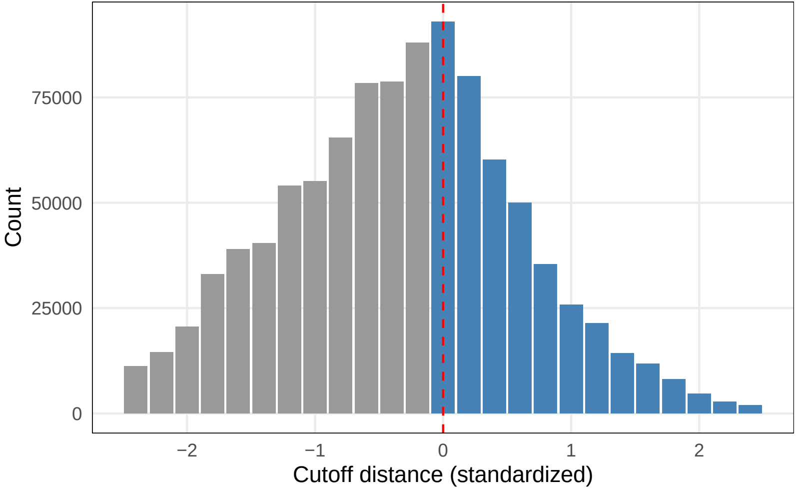
First Stage: Crossing admission cut-offs for College Enrollment (5 years)



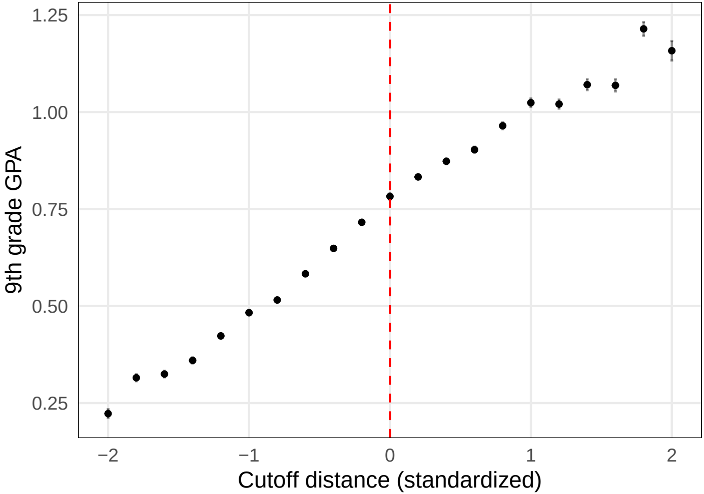
- Focus on fields with $F > 104.7$ (Lee, McCrary, Moreira, and Porter, 2022)

BALANCE

“No Bunching” around admissions cut-offs

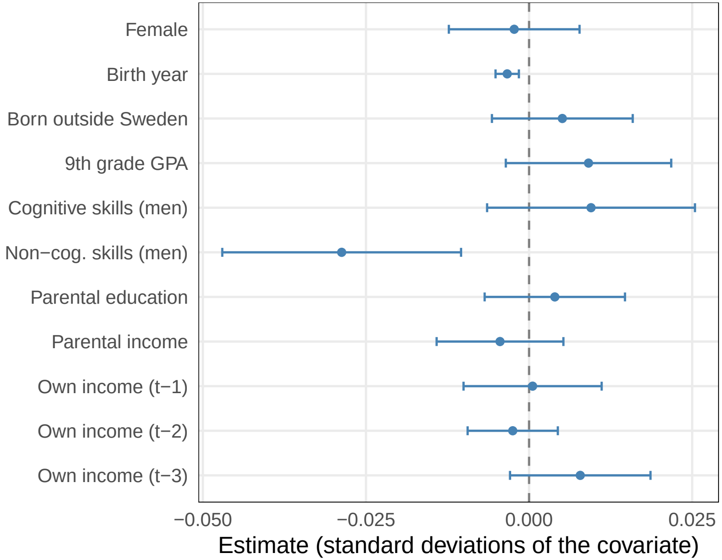


Balance around admission cut-offs



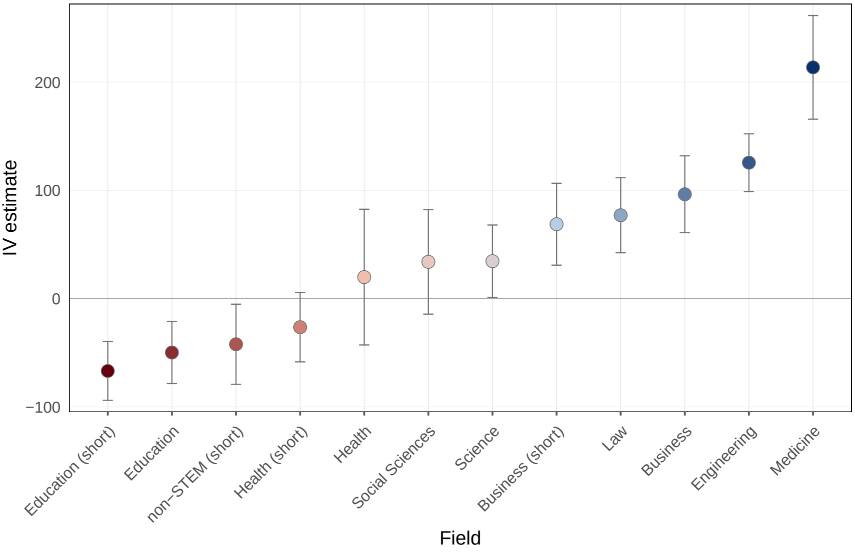
▸ Gender ▸ Cohort ▸ Foreign born ▸ Parental education ▸ Cognitive skills (men) ▸ Non-cognitive skills (men)

Balance around admission cut-offs



LABOR MARKET OUTCOMES

Causal Effect on **Labor Market Outcomes**: Income for Women (age 40-45)



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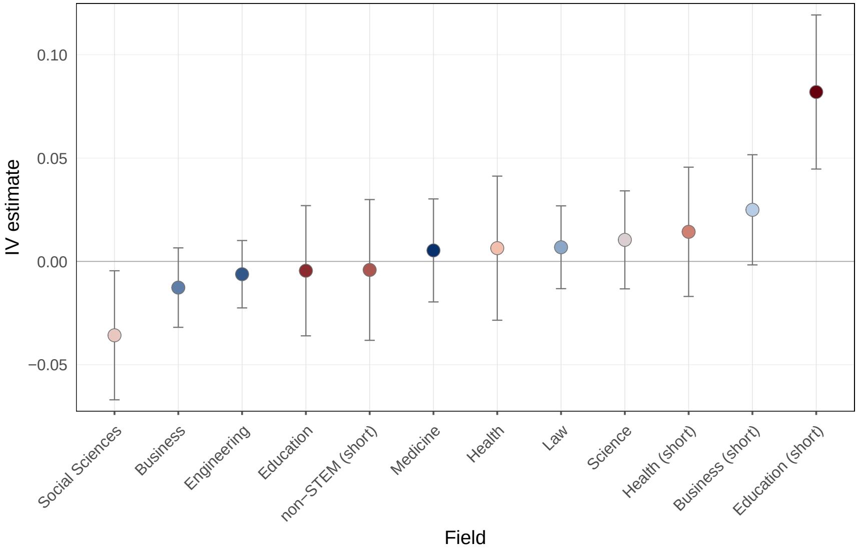
FERTILITY OUTCOMES

Causal Effect on **Any Child** for Women (5 years after application)



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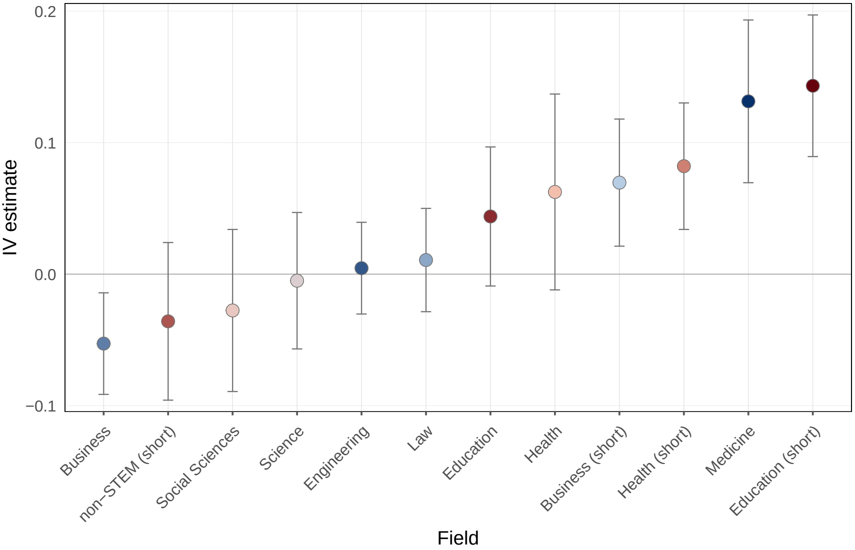
Causal Effect on **Any Child** for Women (10 years after application)



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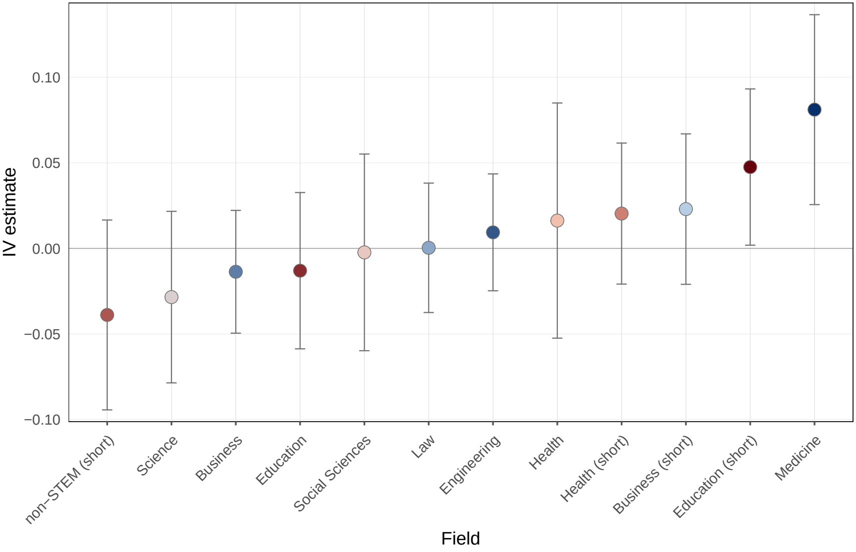
Causal Effect on **Any Child** for Women (15 years after application)



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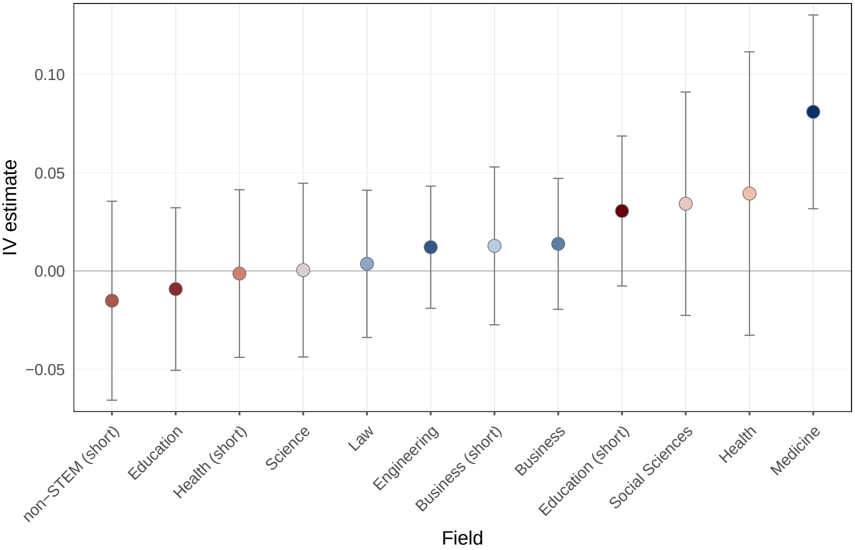
Causal Effect on **Any Child** for Women (20 years after application)



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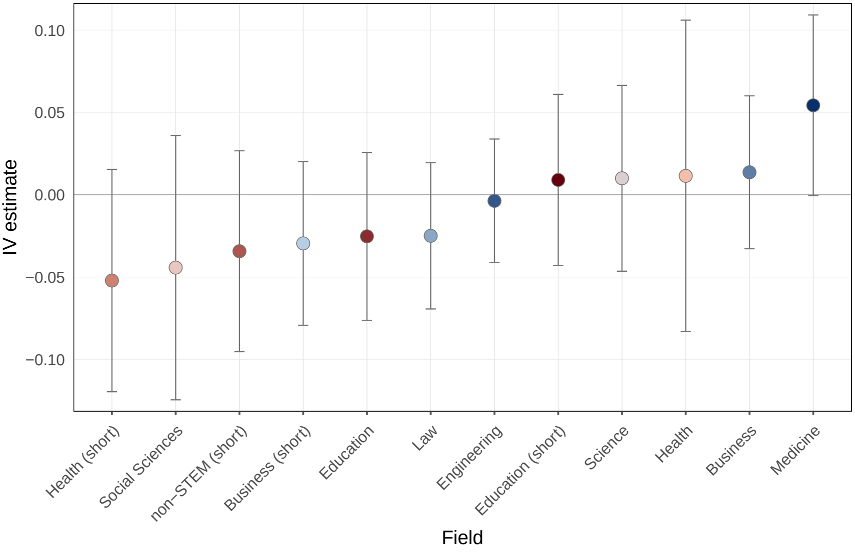
Causal Effect on **Any Child** for women (25 years after application)



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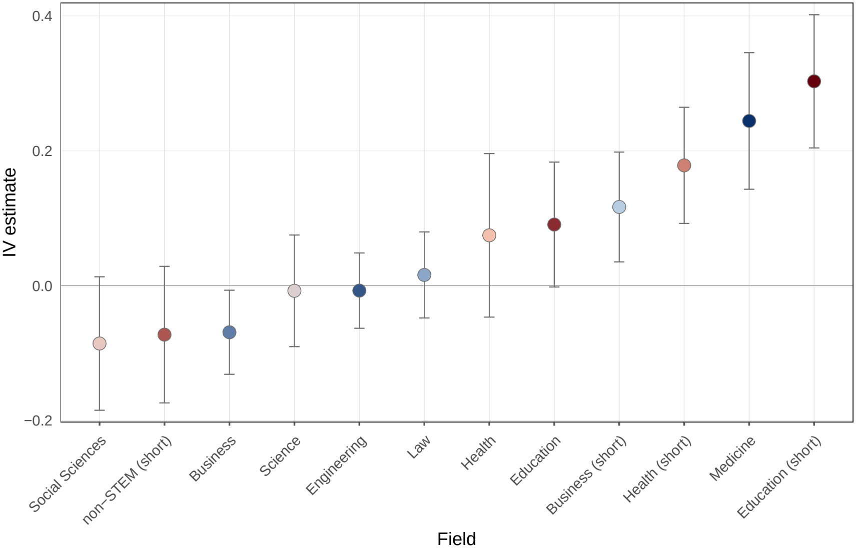
Causal Effect on **Number of Children** for Women (10 yrs after application)



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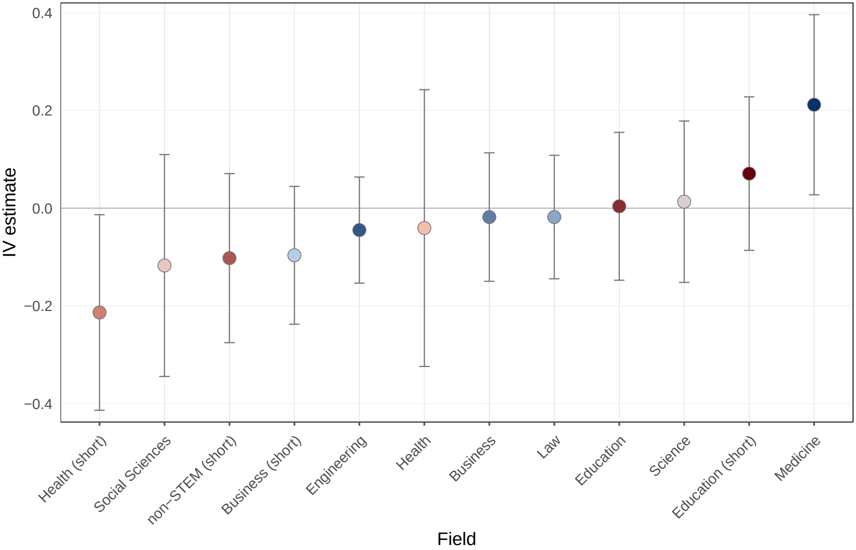
Causal Effect on **Number of Children** for Women (25 yrs after application)



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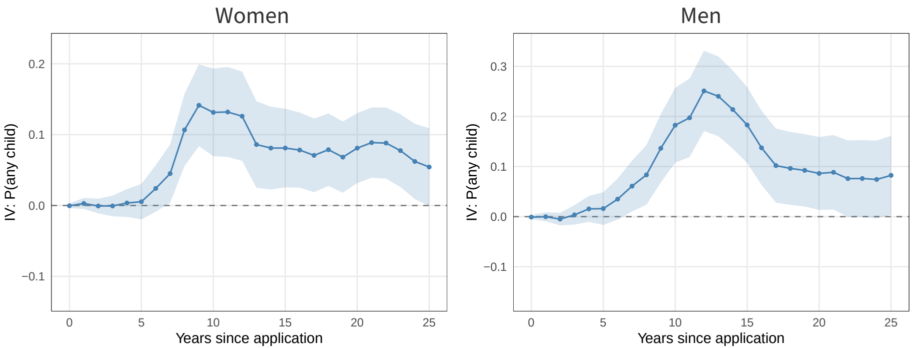
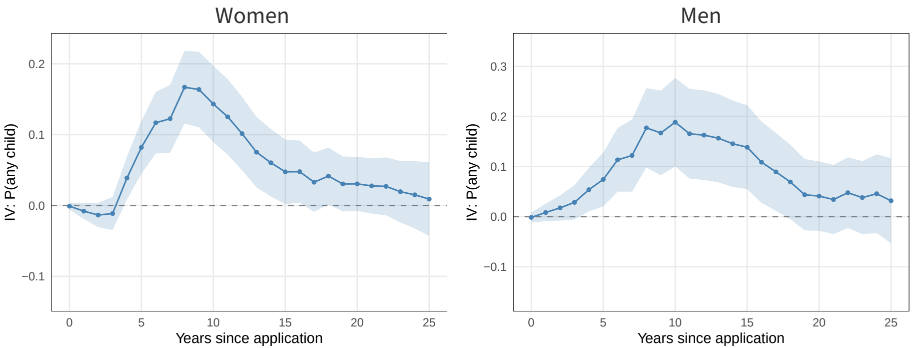
FERTILITY DYNAMICS
(FOR WOMEN AND MEN)

Dynamics of Causal Effects: **Any Child** (**Medicine**)



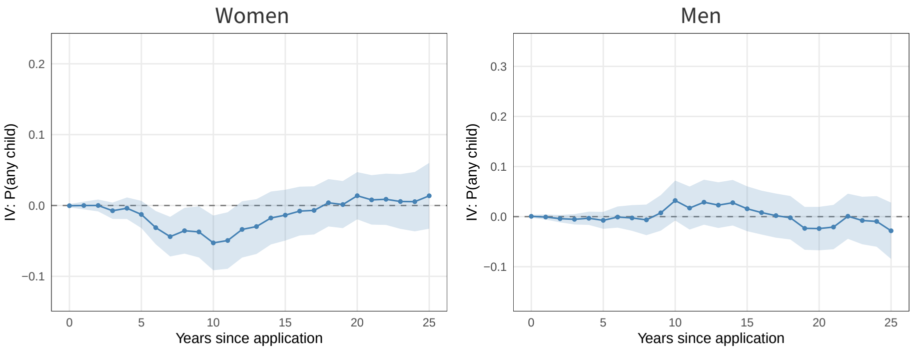
▸ Number of Children

Dynamics of Causal Effects: **Any Child** (**Education (short)**)



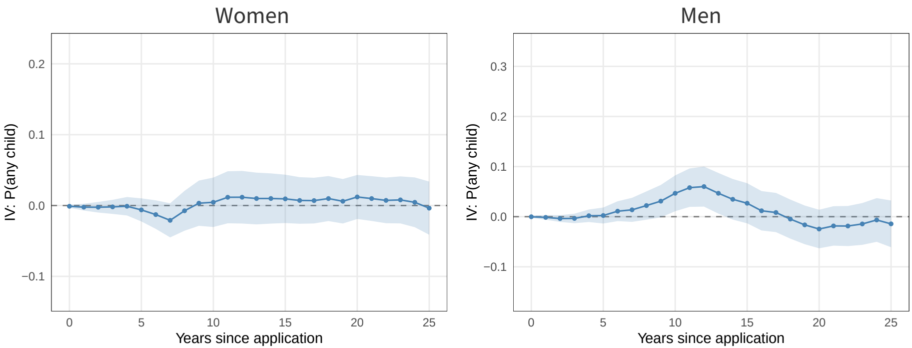
▸ Number of Children

Dynamics of Causal Effects: **Any Child** (**Business**)



▸ Number of Children

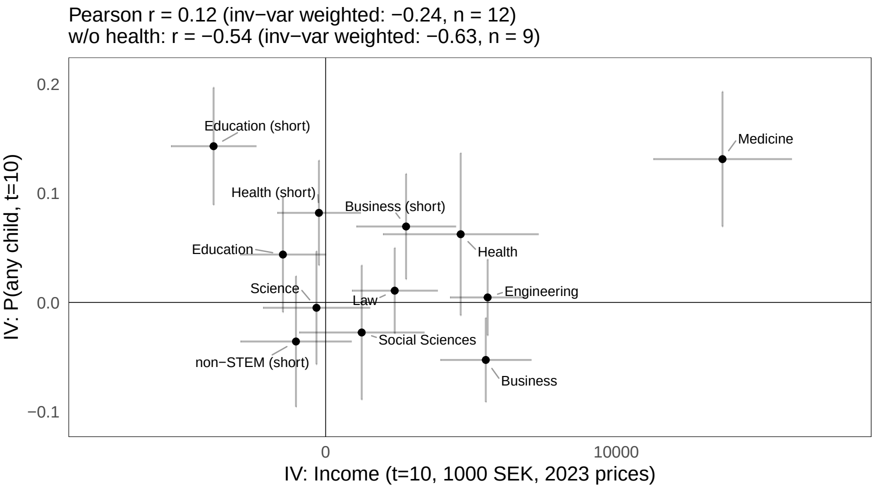
Dynamics of Causal Effects: **Any Child** (**Engineering**)



▸ Number of Children

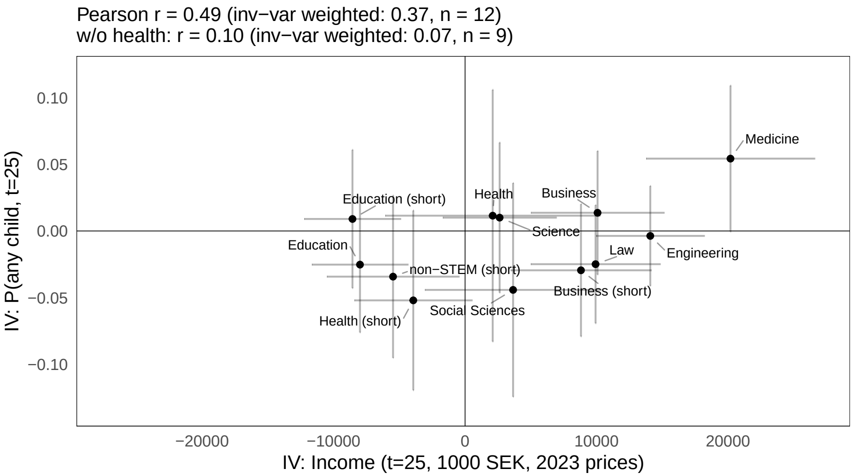
MECHANISMS: Income

Relationship? Causal Effects on **Any Child** and **Income** (t=10)



▸ Men

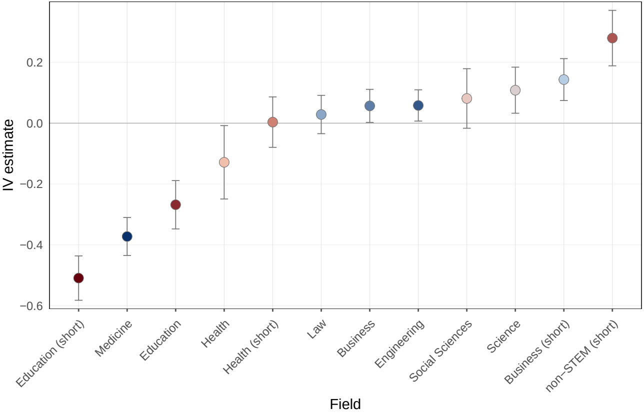
Relationship? Causal Effects on **Any Child** and **Income** (t=25)



▸ Number of Children ▸ Men

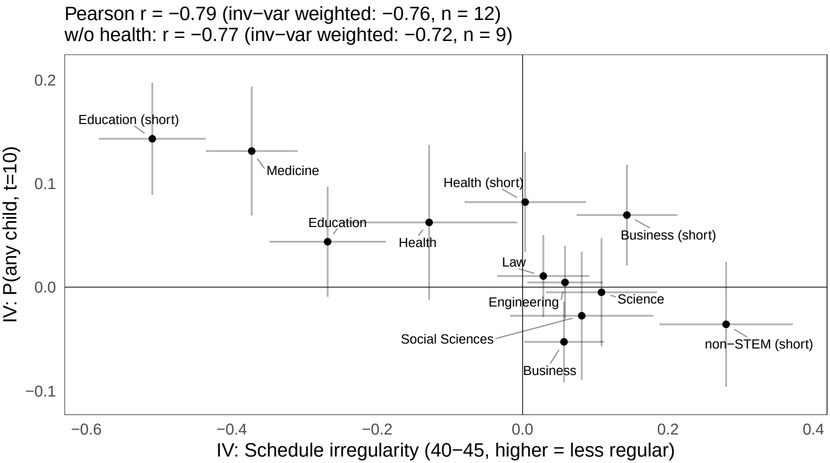
MECHANISMS: Job Conditions

Causal Effect on **Labor Market Outcomes**: Schedule Irregularity (age 40-45)



Notes: Higher values mean a **less regular** schedule. Standardised O*NET work-schedules item, measured on the occupation held at ages 40–45.

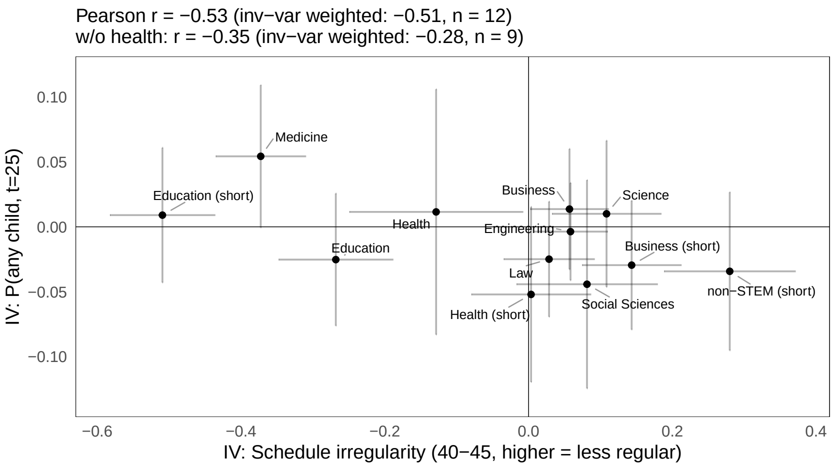
Causal Effects on **Any Child** and **Schedule Irregularity** (t=10)



Notes: Higher values mean a **less regular** schedule.

◀ Back: t=25 ▶ Men

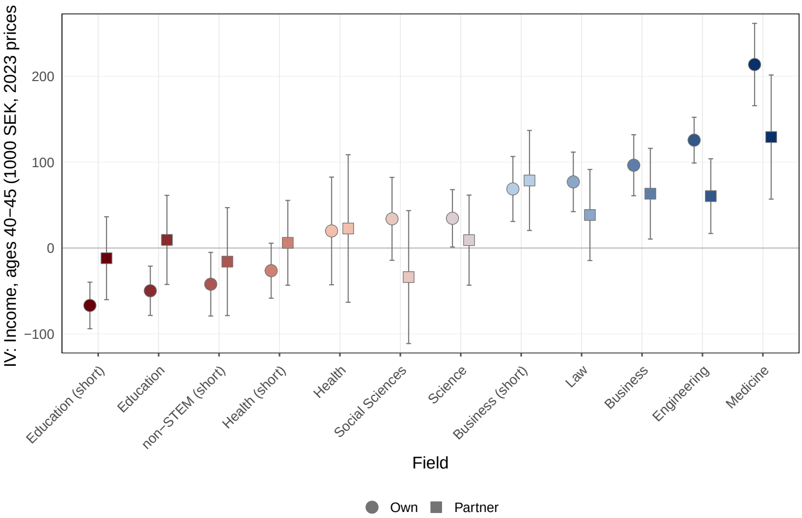
Relationship? Causal Effects on **Any Child** and **Schedule Irregularity** (t=25)



Notes: Higher values mean a **less regular** schedule (standardised O*NET work-schedules item).

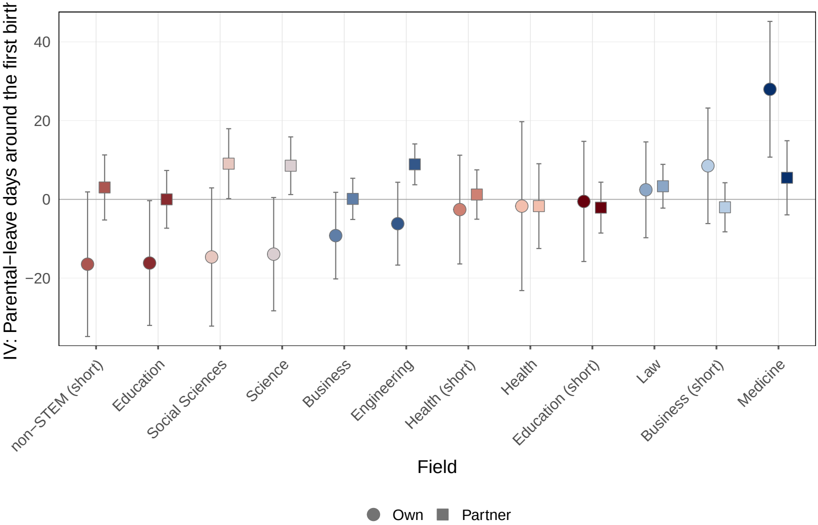
MECHANISMS: Partners

RDD Women’s Partner: Income



▸ Assortative mating: same-field partners

RDD Women's Partner: Parental Leave (first birth, Women)



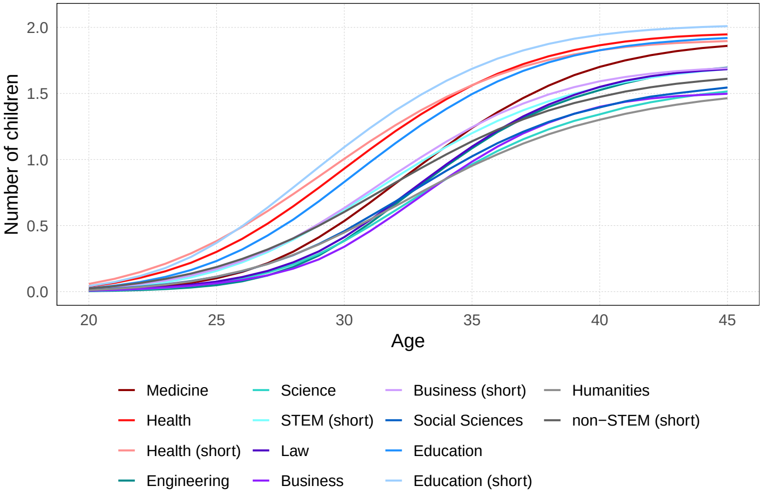
CONCLUSION

Conclusions

- Use fuzzy RDD to estimate the causal effect of enrollment in different fields
    - Short-term (10 years after application): Fields can change timing of entering parenthood
        - Getting into preferred program can lead to earlier transition into parenthood (e.g. Education)
        - Other fields cause delays in having children (e.g. Business, Engineering)
    - Long-term (25 years after application): Impacts more muted on completed fertility
        - Impacts persist in some fields (e.g. Medicine)
        - No effect on completed fertility in demanding fields
- **What could be driving these effects on fertility?**
    - Find no evidence of an association between income effects and completed fertility effects
    - Strong association between irregular schedules and delay; completed fertility smaller
    - Partners of women in "greedy" jobs compensate with additional income and leave
- Important to look at completed fertility as education affects both timing and total fertility

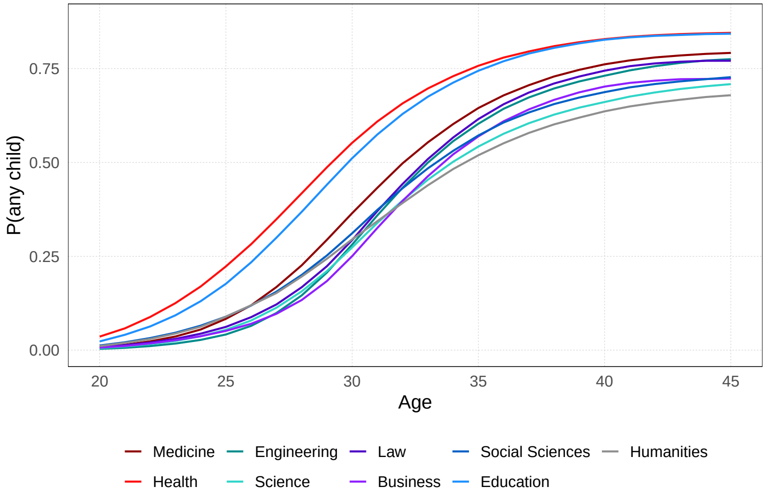
Appendix

Education-Field-Fertility Gradient



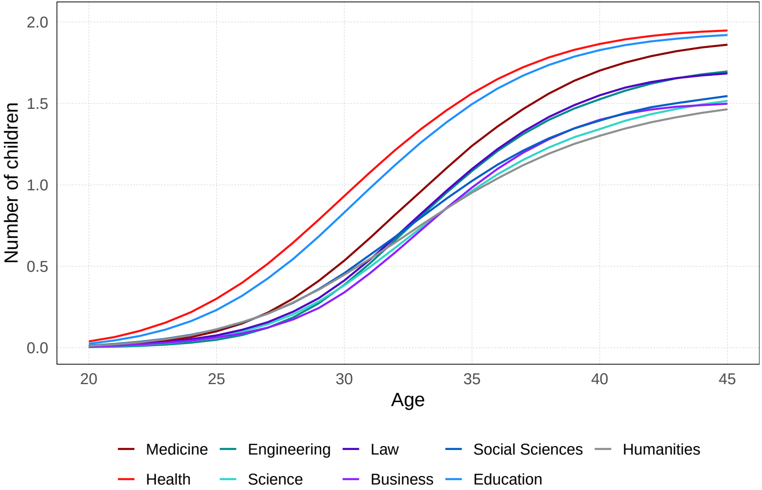
Back: Any Childbirth | Any Child (Long) | N Children (Long) | Any Child (Short) | N Children (Short) | Any Child (Level) | N Children (Level)

Education-Field-Fertility Gradient: Long Programs



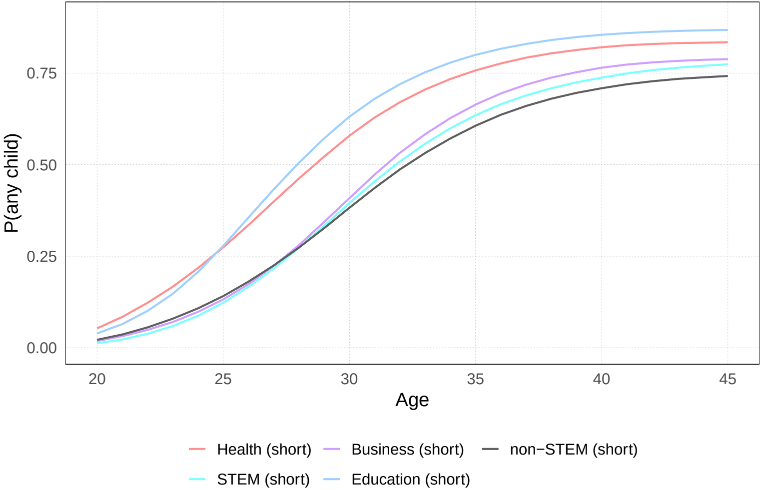
Back: Any Childbirth
N Children
N Children (Long)
Any Child (Short)
N Children (Short)
Any Child (Level)
N Children (Level)

Education-Field-Fertility Gradient: Long Programs



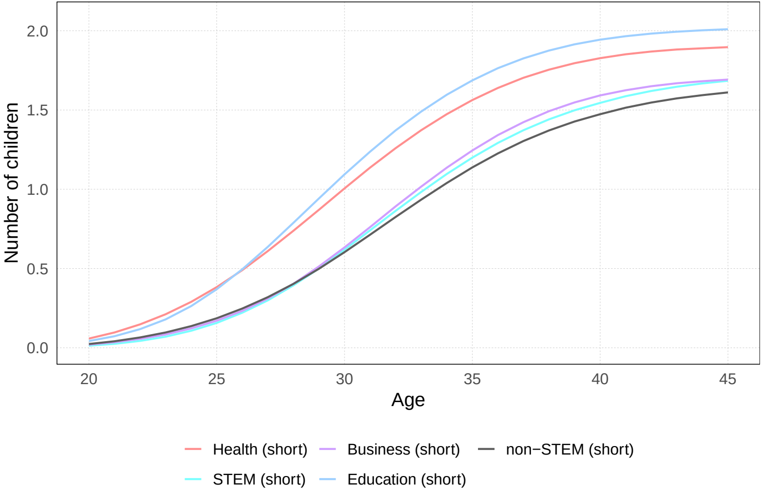
Back: Any Childbirth | N Children | Any Child (Long) | Any Child (Short) | N Children (Short) | Any Child (Level) | N Children (Level)

Education-Field-Fertility Gradient: Short Programs



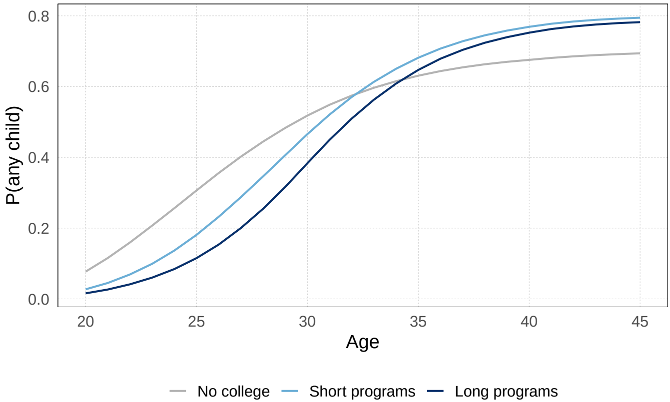
▸ **Back:** Any Childbirth ▸ N Children ▸ Any Child (Long) ▸ N Children (Long) ▸ N Children (Short) ▸ Any Child (Level) ▸ N Children (Level)

Education-Field-Fertility Gradient: Short Programs



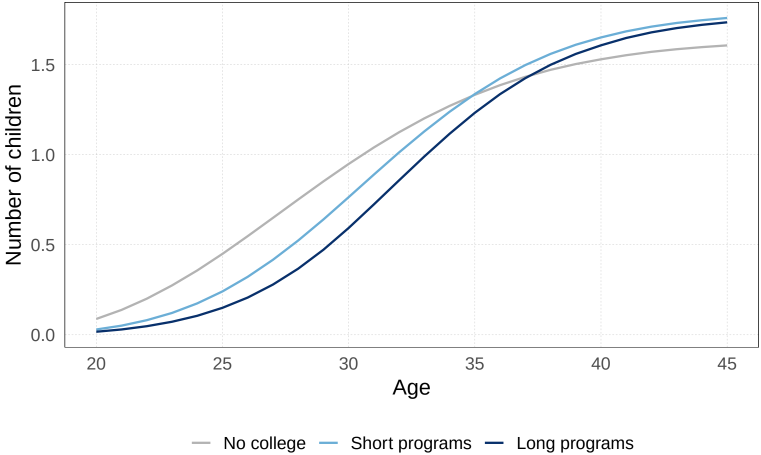
▸ **Back:** Any Childbirth ▸ N Children ▸ Any Child (Long) ▸ N Children (Long) ▸ Any Child (Short) ▸ Any Child (Level) ▸ N Children (Level)

Education-Level-Fertility Gradient



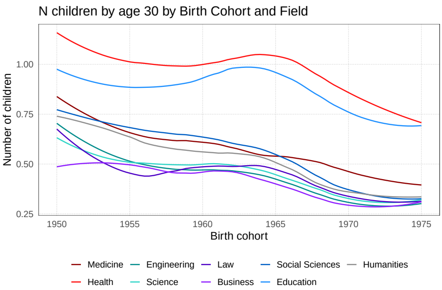
▸ **Back:** Any Childbirth ▸ N Children ▸ Any Child (Long) ▸ N Children (Long) ▸ N Children (Short) ▸ N Children (Level)

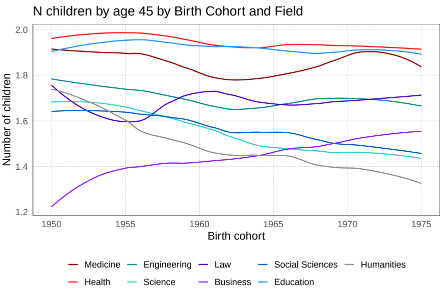
Education-Level-Fertility Gradient



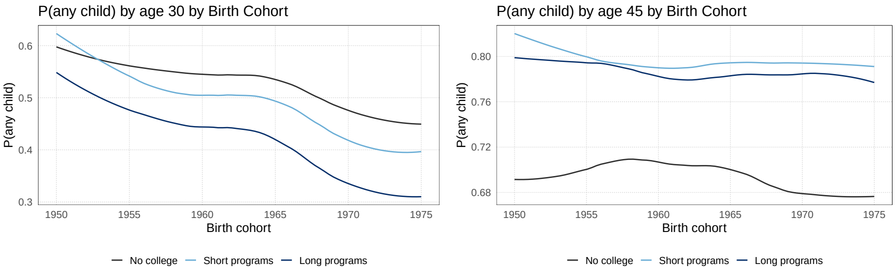
▸ **Back:** Any Childbirth ▸ N Children ▸ Any Child (Long) ▸ N Children (Long) ▸ Any Child (Short) ▸ Any Child (Level)

Education-Field-Fertility Gradient: by Cohort (Age 30 vs. 45)

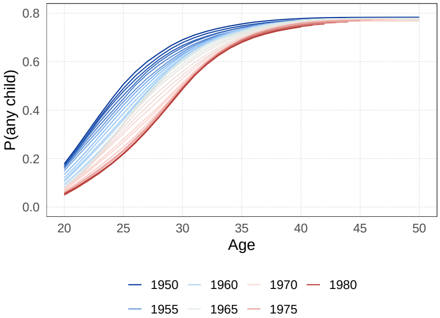




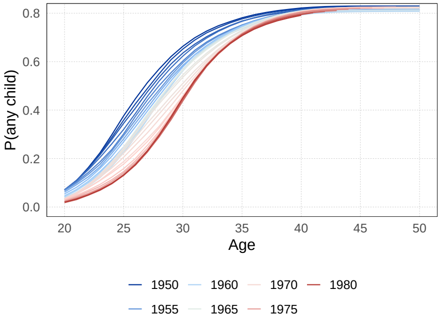
Education-Level-Fertility Gradient: by Cohort (Age 30 vs. 45)



Cohort-Fertility Gradient: Any Child

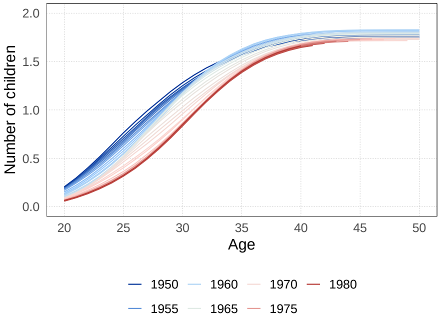


All



College

Cohort-Fertility Gradient: N Children



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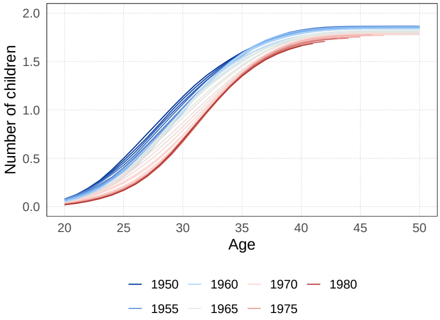
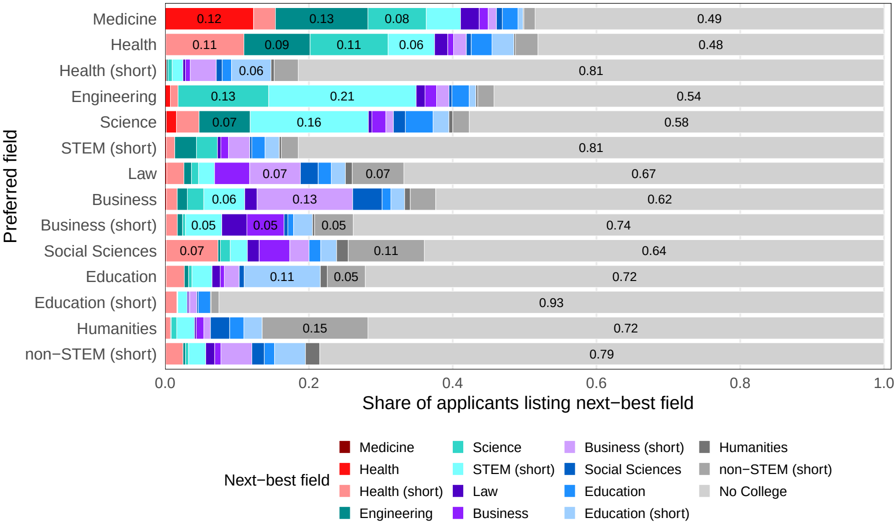
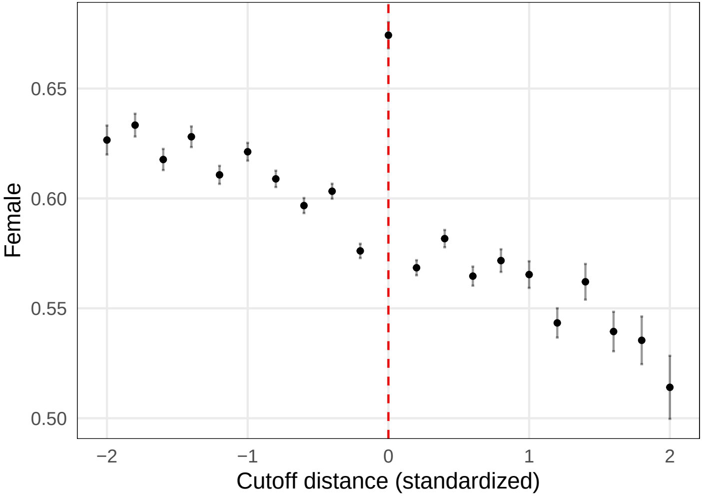


College

Preferred Field and Share of Applicants listing each Next-best Alternative

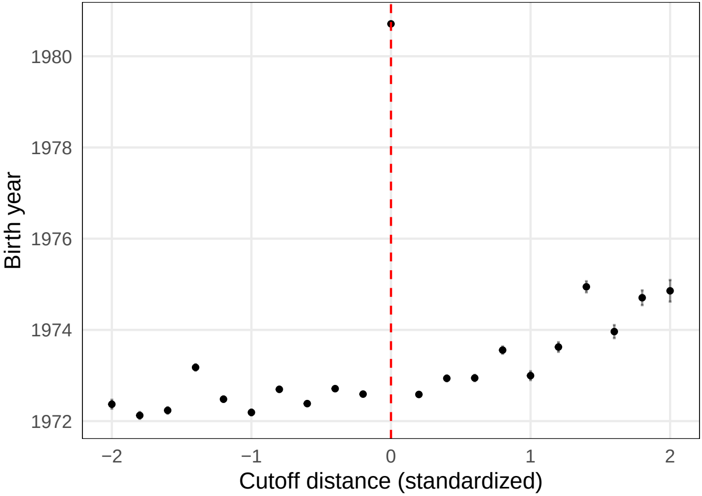


Balance around admission cut-offs



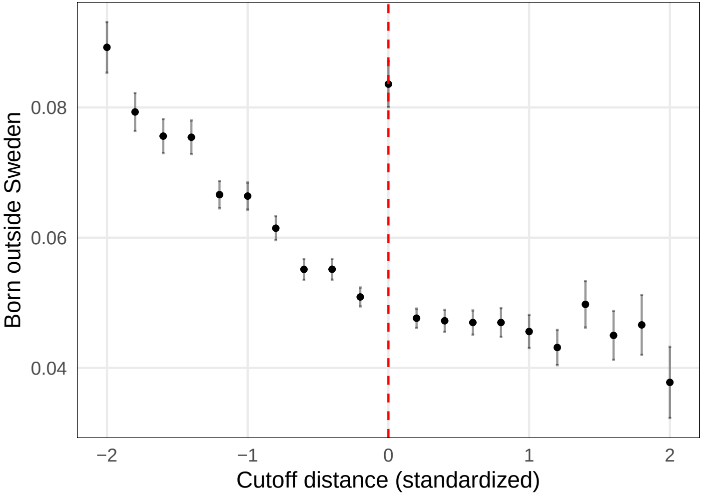
▸ **Back:** Balance (9th grade GPA)

Balance around admission cut-offs



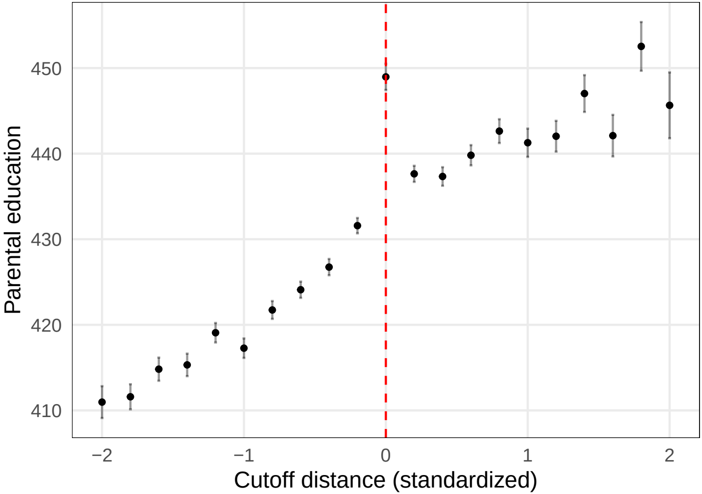
▸ **Back:** Balance (9th grade GPA)

Balance around admission cut-offs



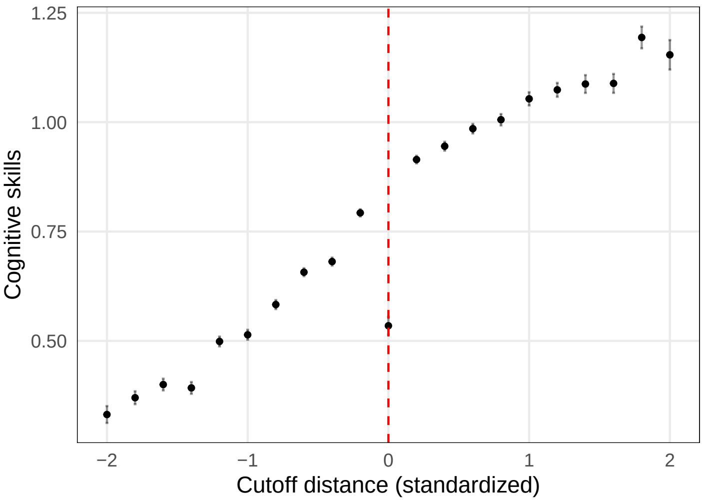
Back: Balance (9th grade GPA)

Balance around admission cut-offs



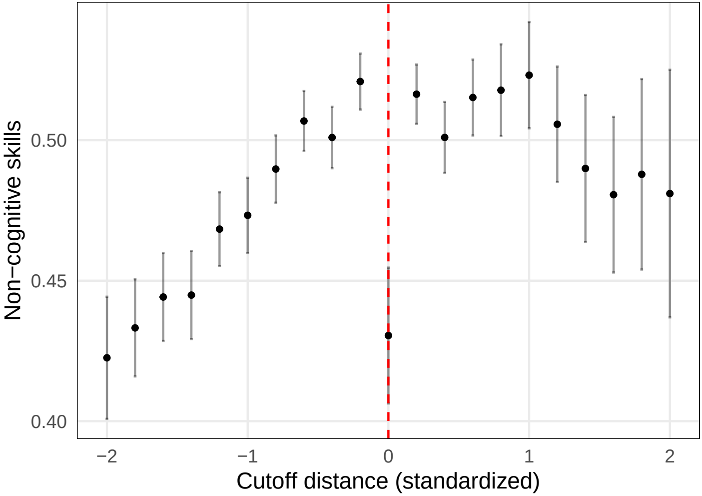
▸ **Back:** Balance (9th grade GPA)

Balance around admission cut-offs



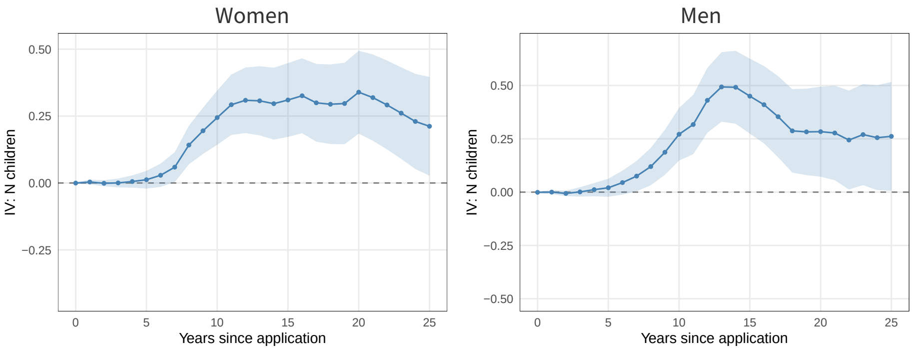
▸ **Back:** Balance (9th grade GPA)

Balance around admission cut-offs



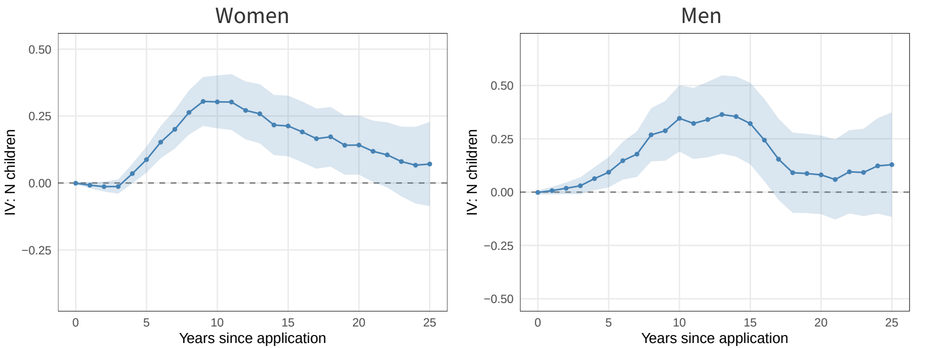
▸ **Back:** Balance (9th grade GPA)

Dynamics of Causal Effects: **Number of Children** (**Medicine**)



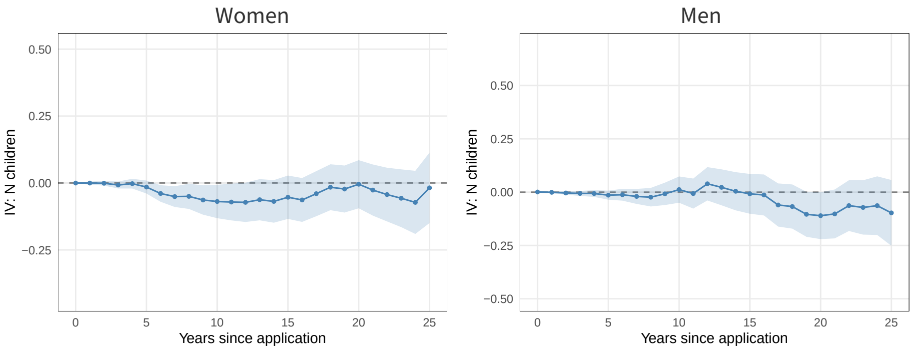
▸ Any Child

Dynamics of Causal Effects: **Number of Children** (**Education (short)**)



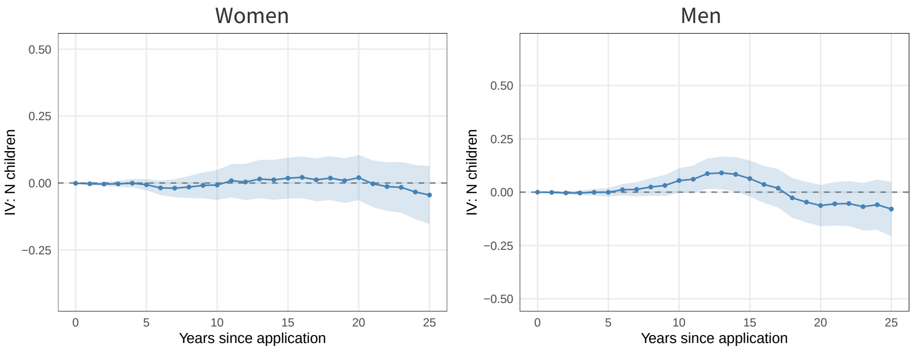
▸ Any Child

Dynamics of Causal Effects: **Number of Children** (Business)



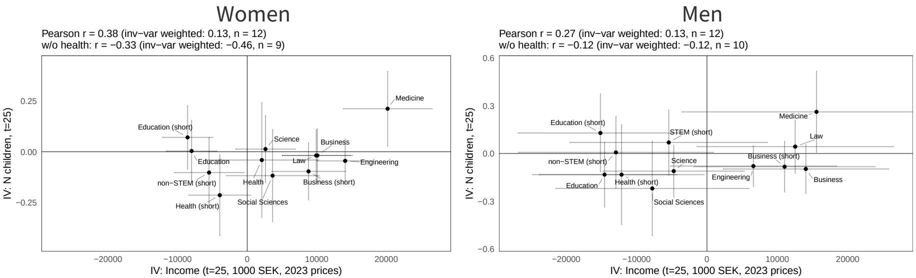
▸ Any Child

Dynamics of Causal Effects: **Number of Children** (Engineering)



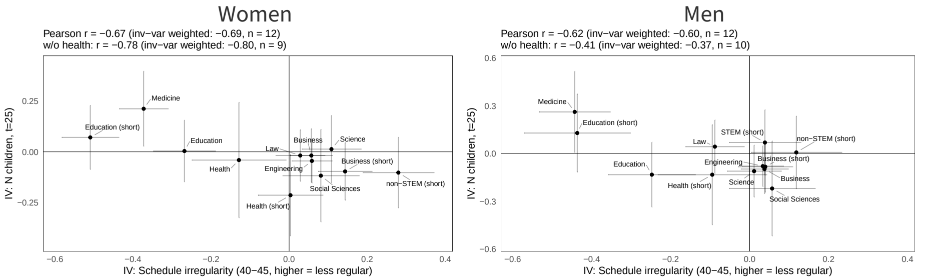
▸ Any Child

Relationship? Causal Effects on **N Children** and **Income** (t=25)



▶ **Back:** Any Child

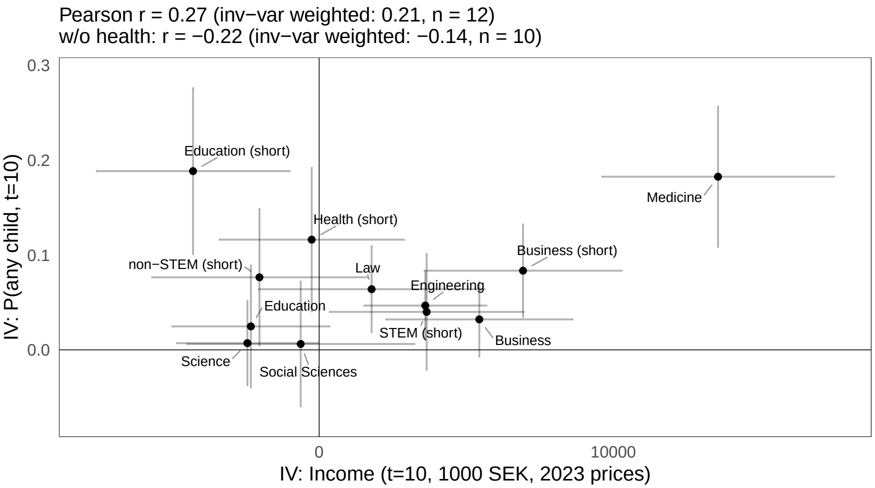
Relationship? Causal Effects on **N Children** and **Schedule Irregularity** (t=25)



Notes: Higher values mean a **less regular** schedule (standardised O*NET work-schedules item).

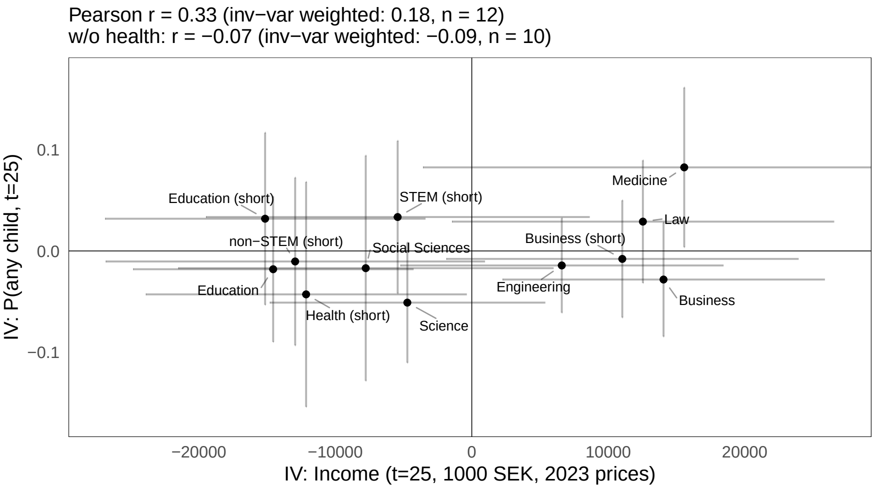
▸ **Back:** Any Child

Relationship? Causal Effects on **Any Child** and **Income** (t=10, Men)



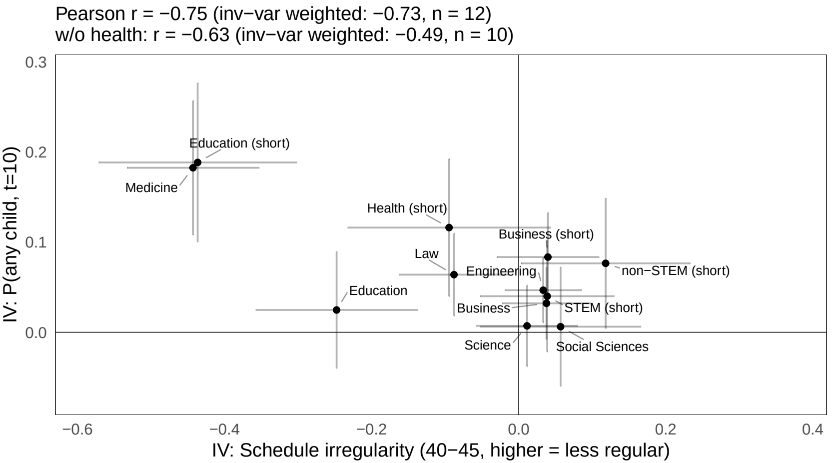
Back: Women

Relationship? Causal Effects on **Any Child** and **Income** (t=25, Men)



◂ Back: Women

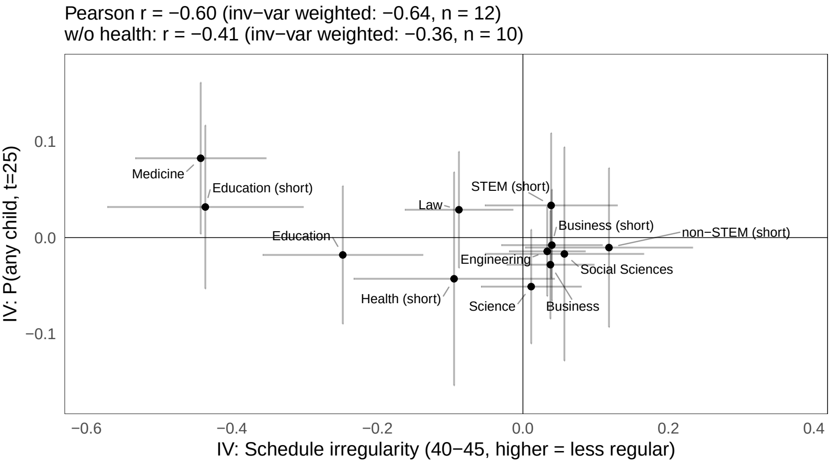
Causal Effects on **Any Child** and **Schedule Irregularity** (t=10, Men)



Notes: Higher values mean a **less regular** schedule.

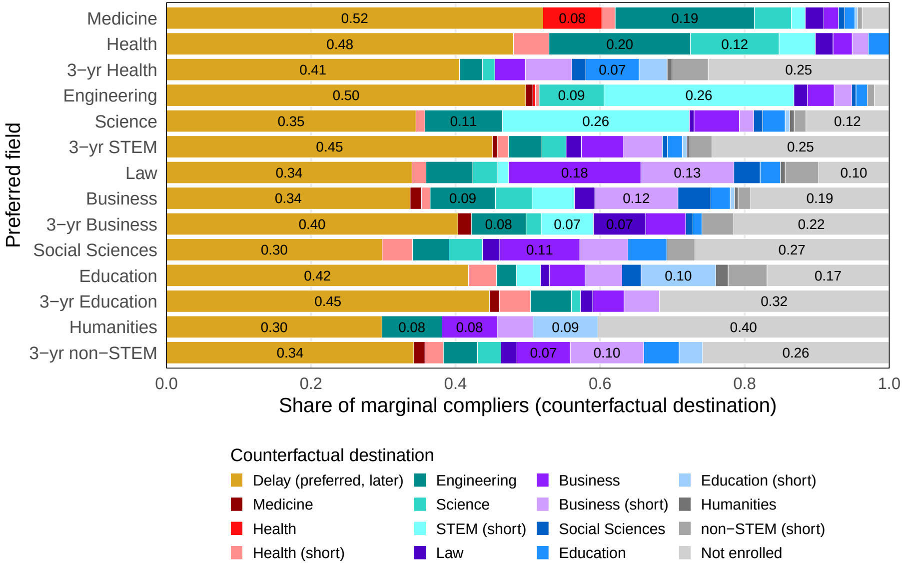
◀ Back: Women

Relationship? Causal Effects on **Any Child** and **Schedule Irregularity** (t=25, Men)



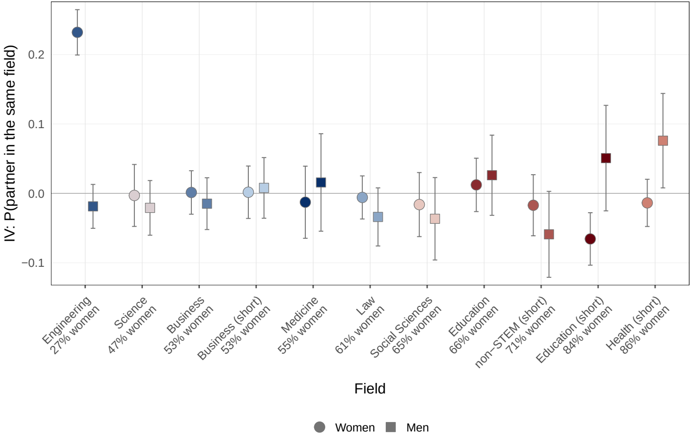
Notes: Higher values mean a **less regular** schedule (standardised O*NET work-schedules item).

Effective Next Best: Where Marginal Applicants Go Instead (Men)



Altmejd, Humphries, Joensen & Veramendi

Assortative Mating: Partner in the Same Field



Notes: 2SLS effect of admission on P(partner in the same field), women (dark) and men (light), fields ordered by the share of women among within-bandwidth applications (printed under each pair). The effect appears for the scarce sex.

Back: Partner income