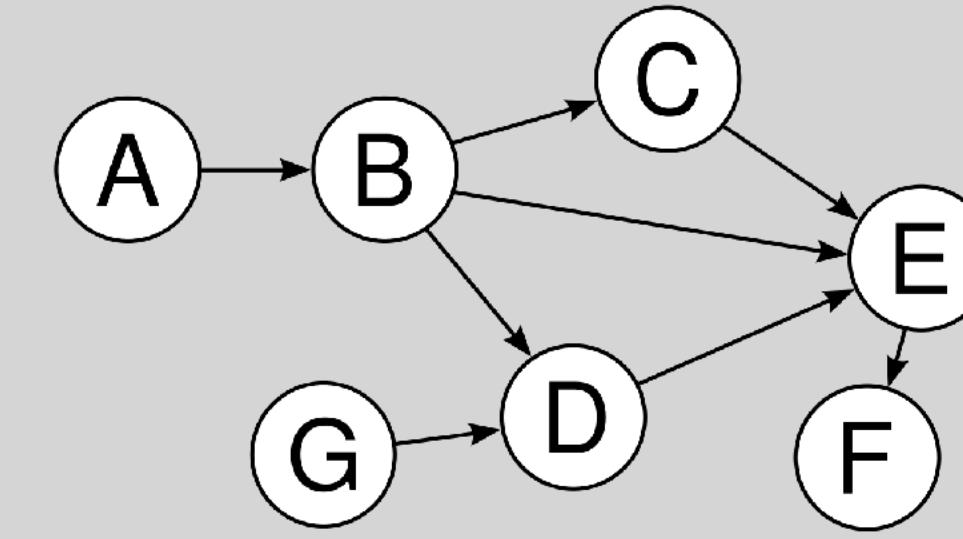
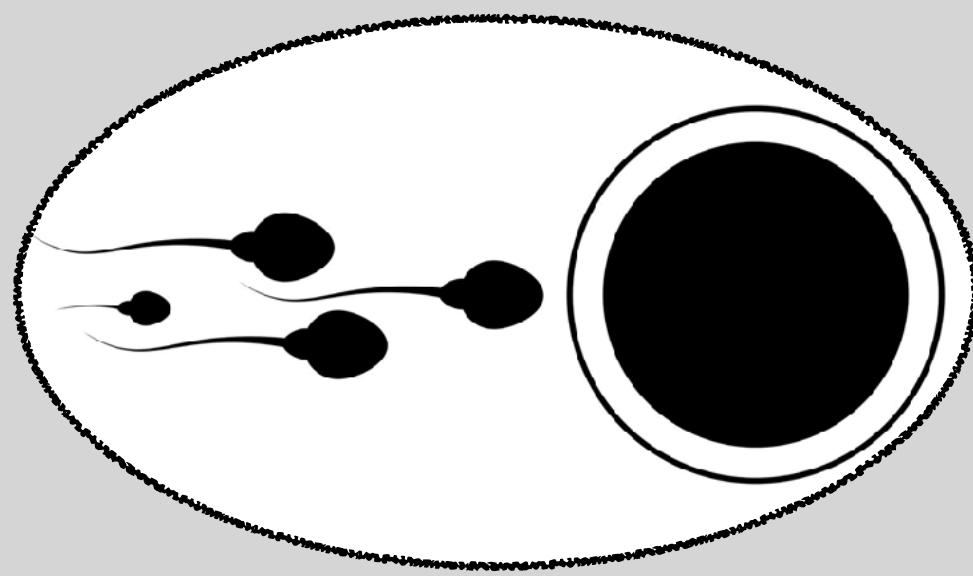
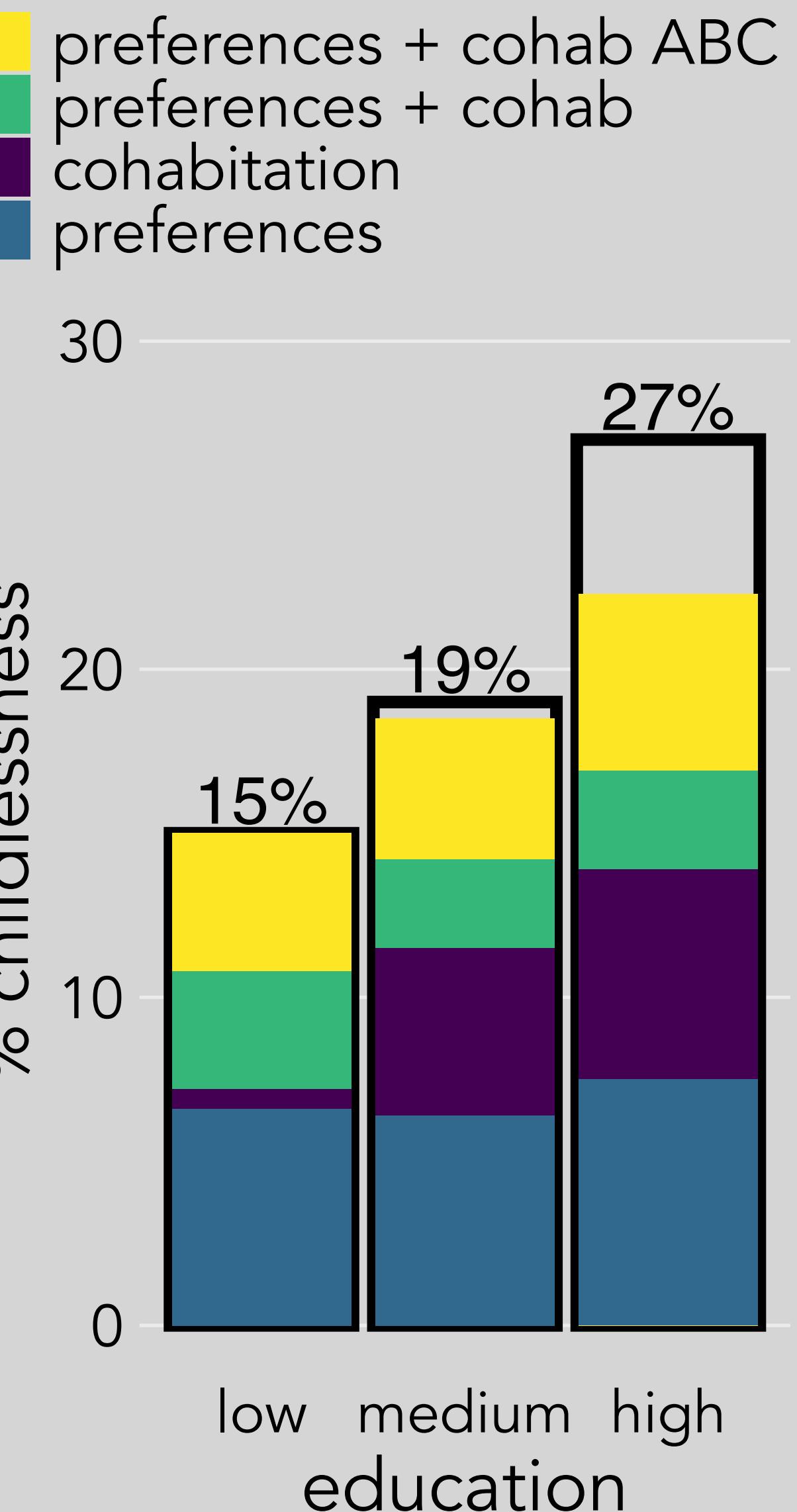
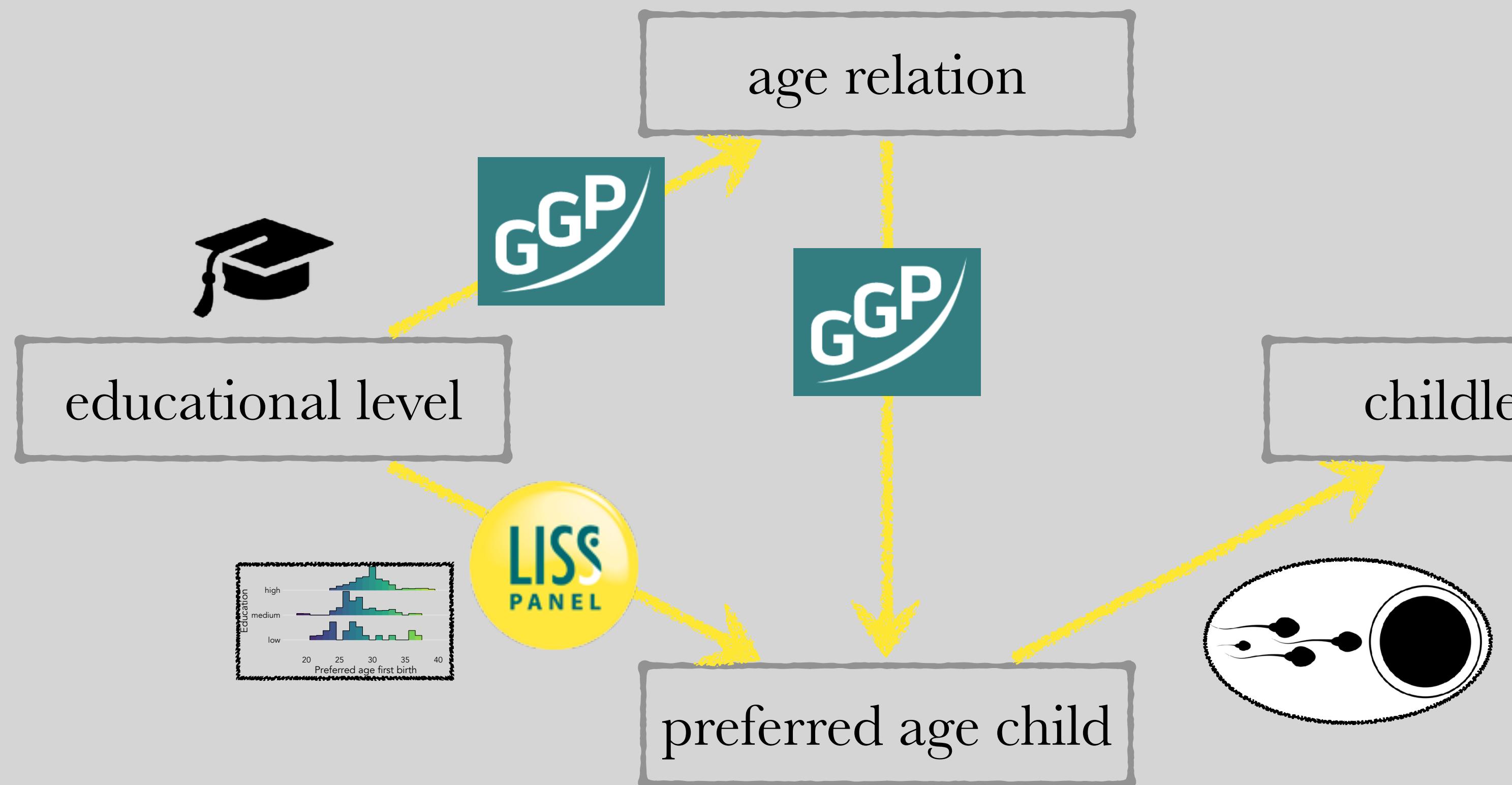


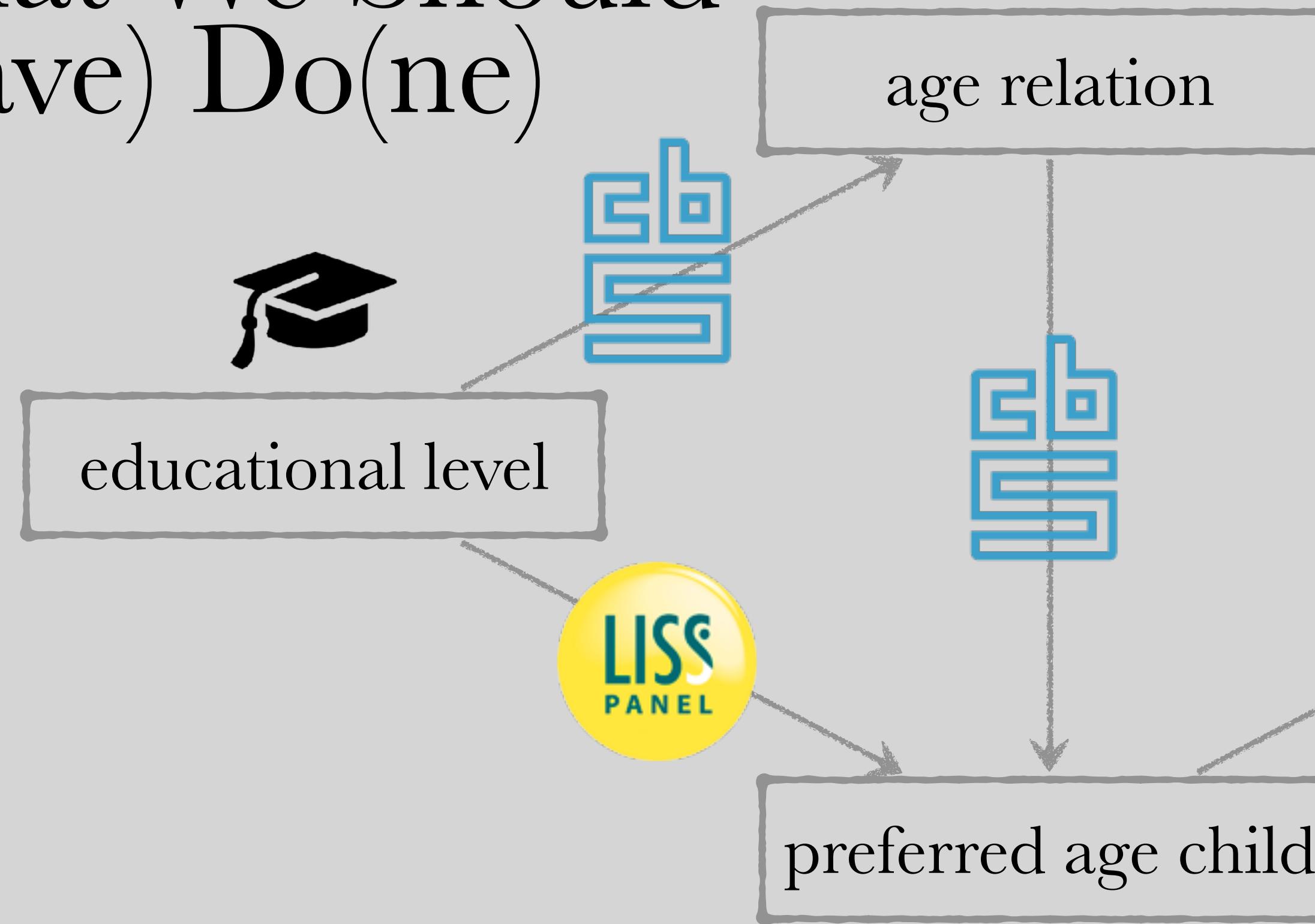
A microsimulation model of fertility shows
that preferences cannot explain why highly
educated women remain childless more often



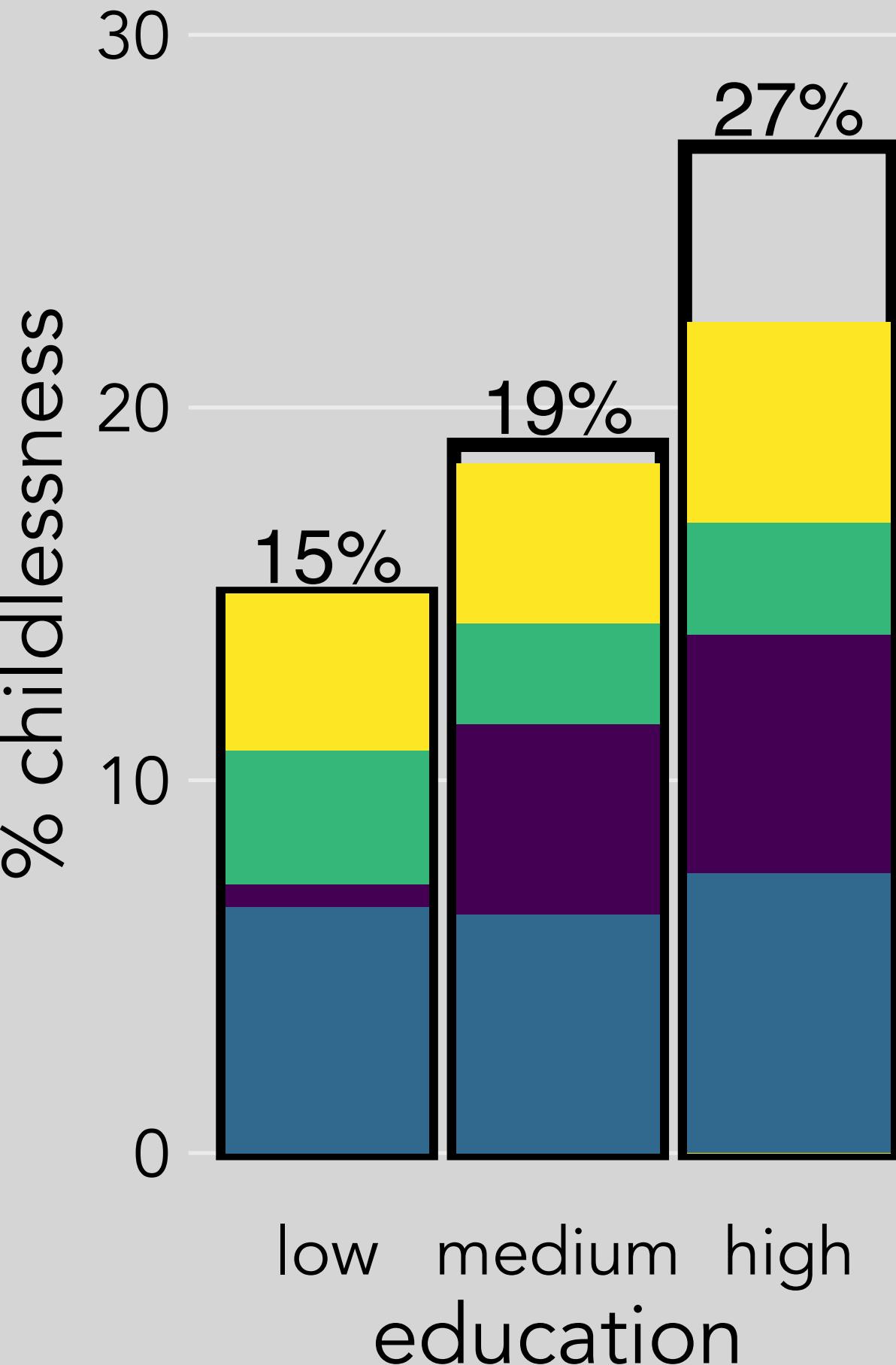
{ ABC }



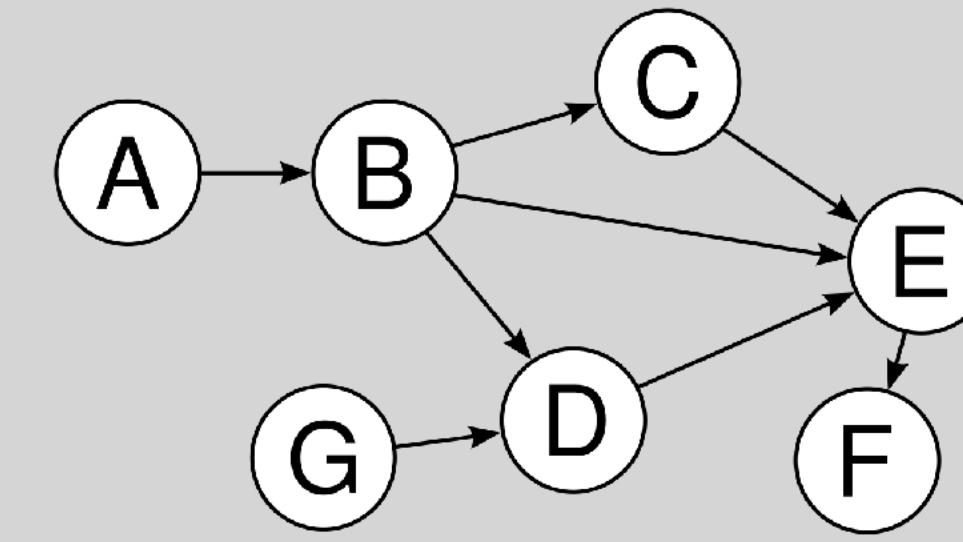
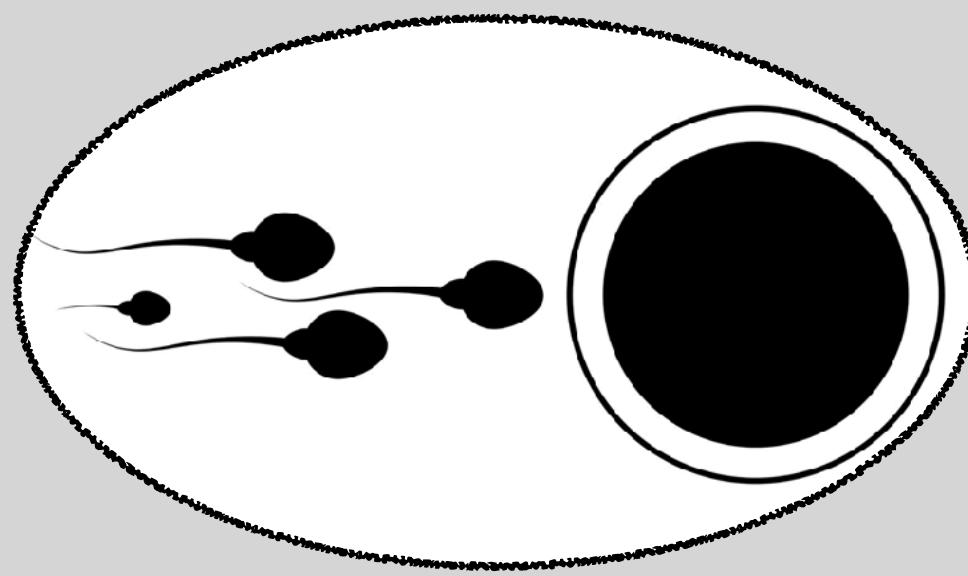
What We Should (Have) Do(ne)



preferences + cohab ABC
preferences + cohab
cohabitation
preferences



Using microsimulation, administrative data, and supercomputers to realistically model fertility behaviour: the case of fertility preferences and childlessness



{ ABC }

% childfree

50

0

25%

7%

17%

24%

38%

I

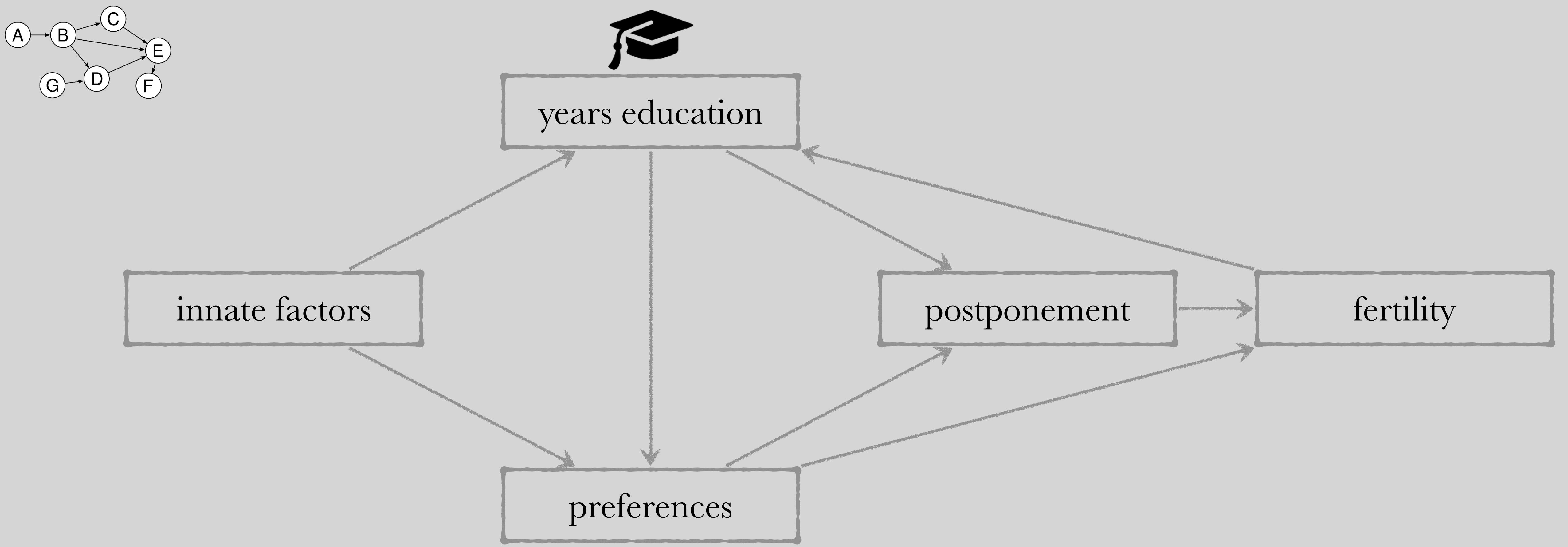
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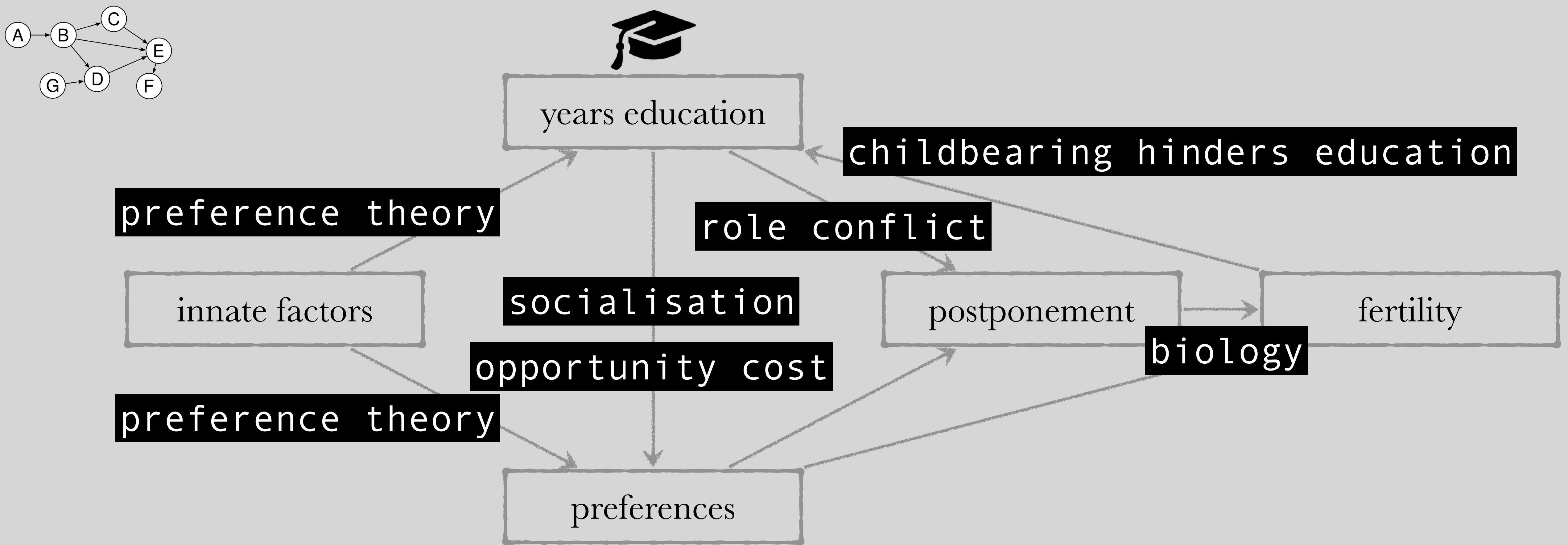
III

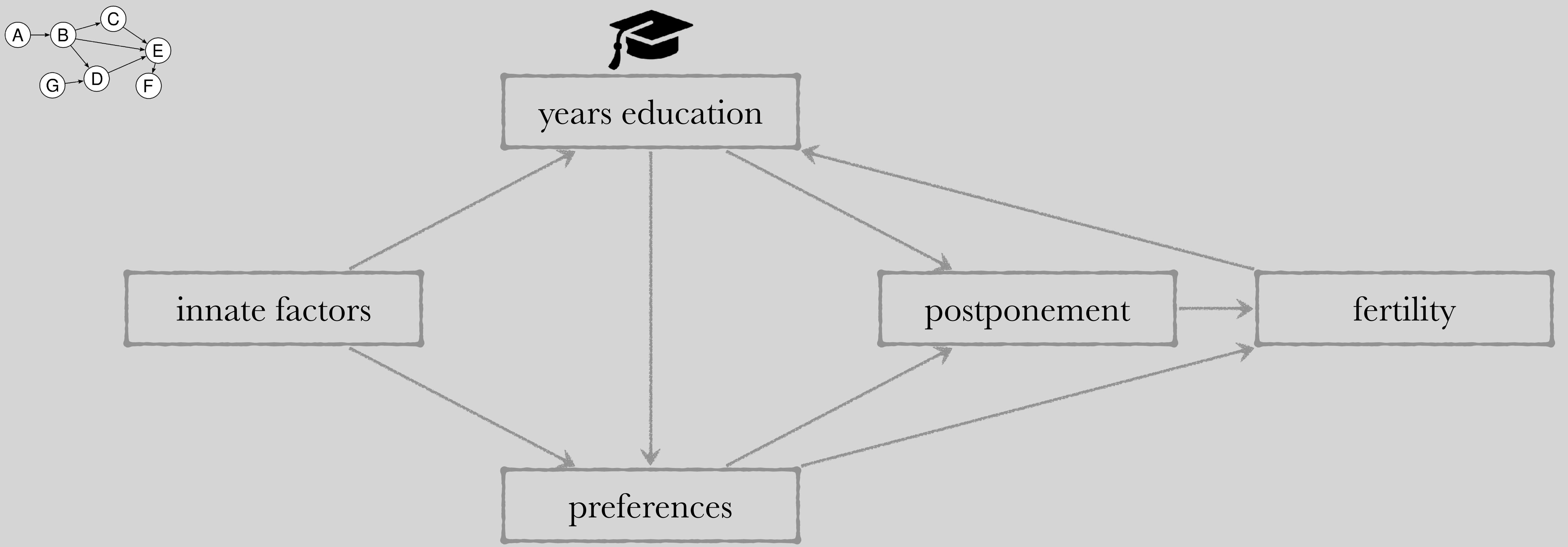
IV

V

level of education





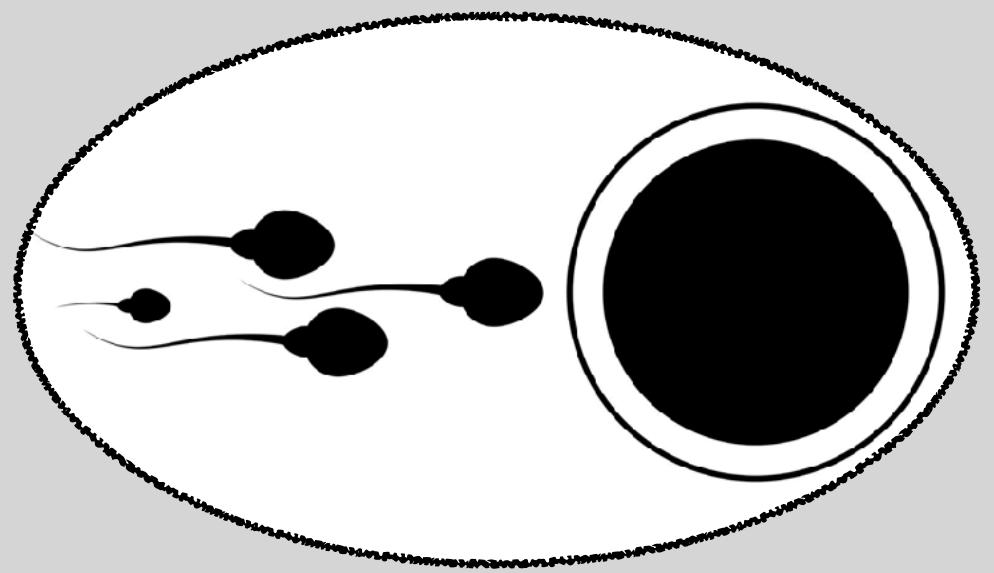


What Kind of Data
Would We need to
Address This Model?

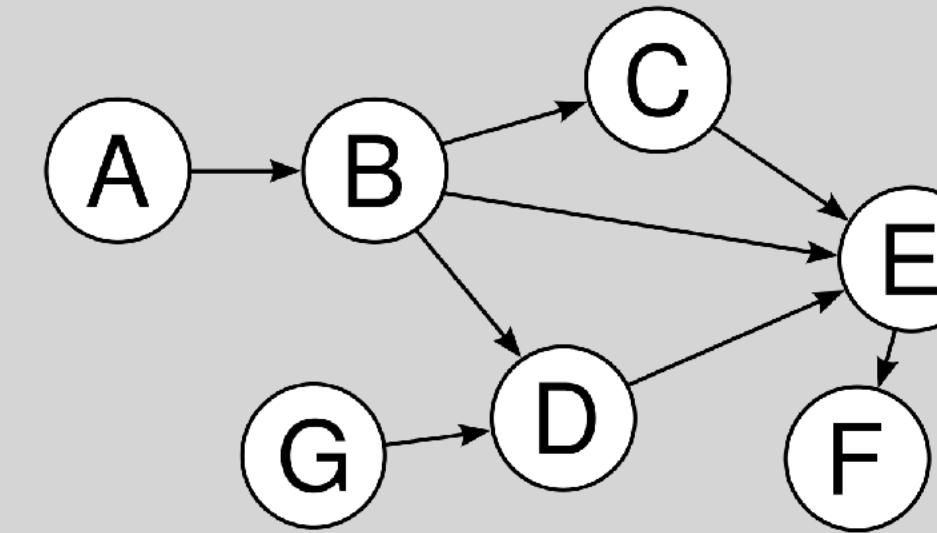
Take-Home Messages

microsimulation
can advance
sociological research

microsimulation can:



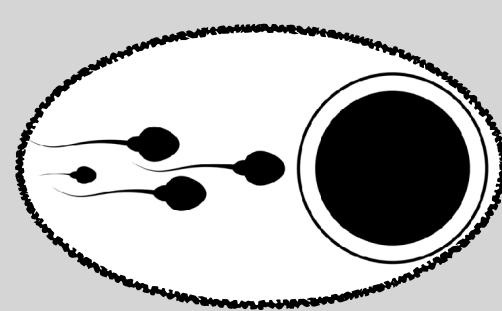
include
biological
information



test (causal)
mechanisms

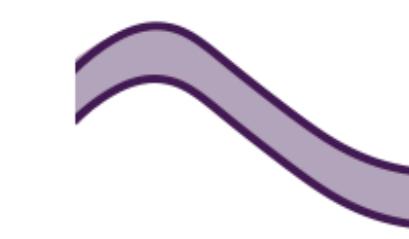
{ ABC }

estimate unknown
parameters



MODEL INPUT

biological parameters



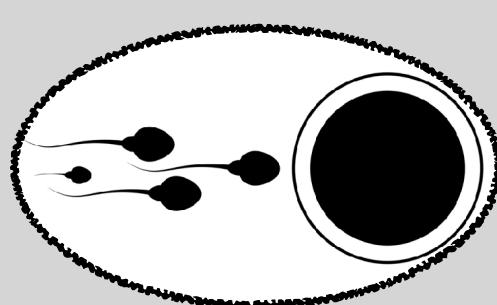
fecundability
with age



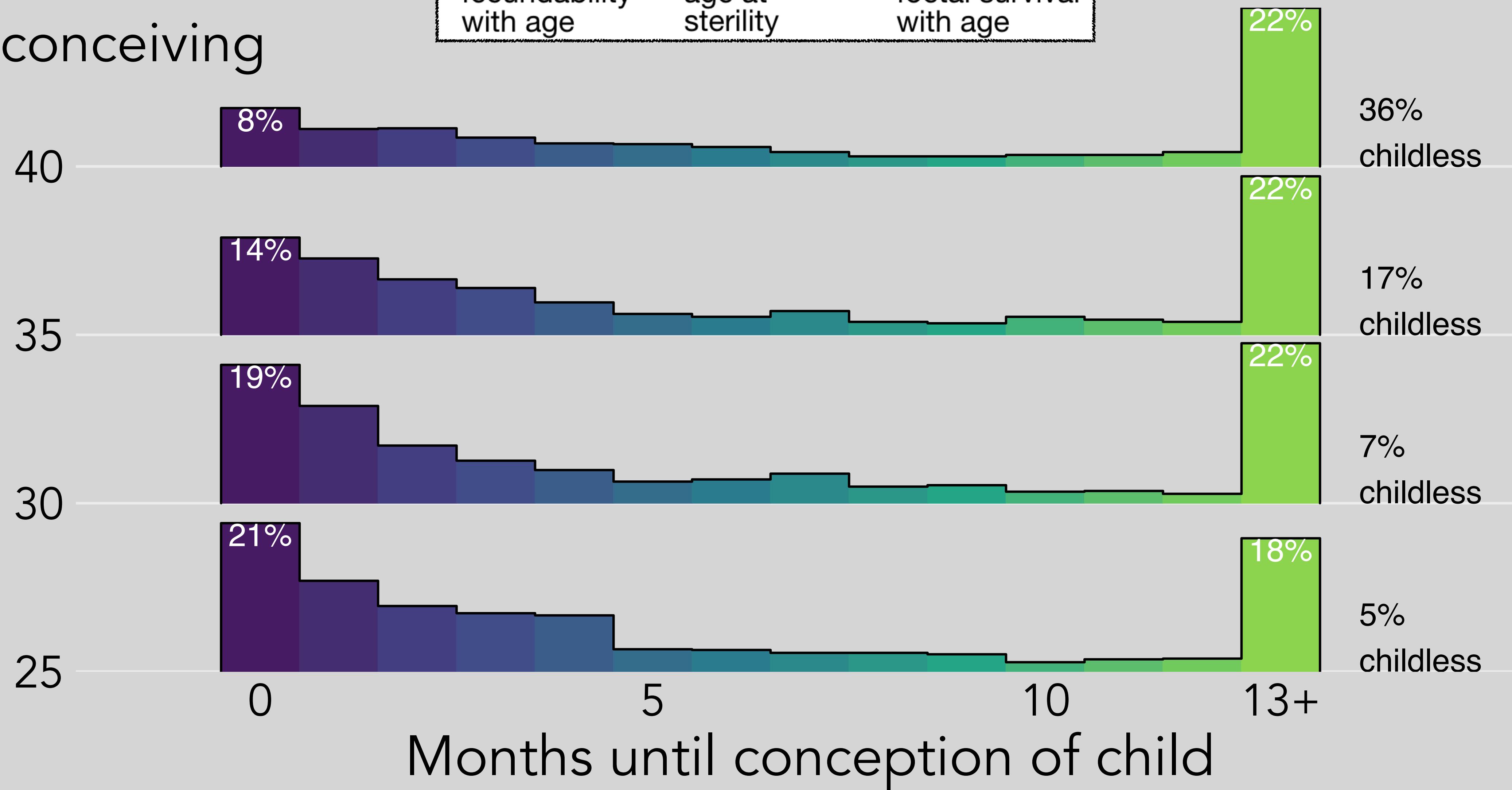
age at
sterility

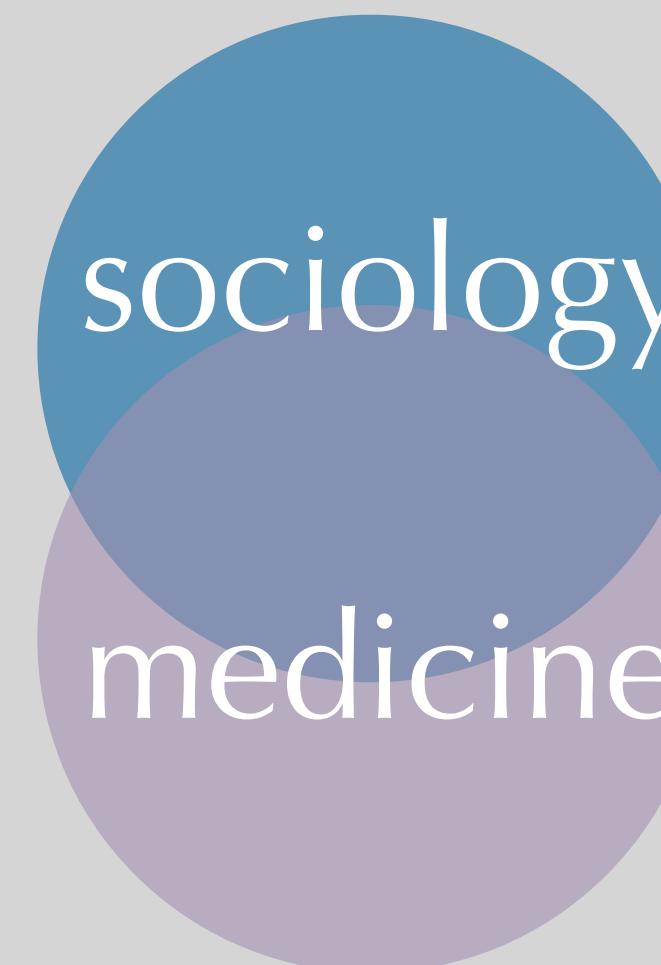
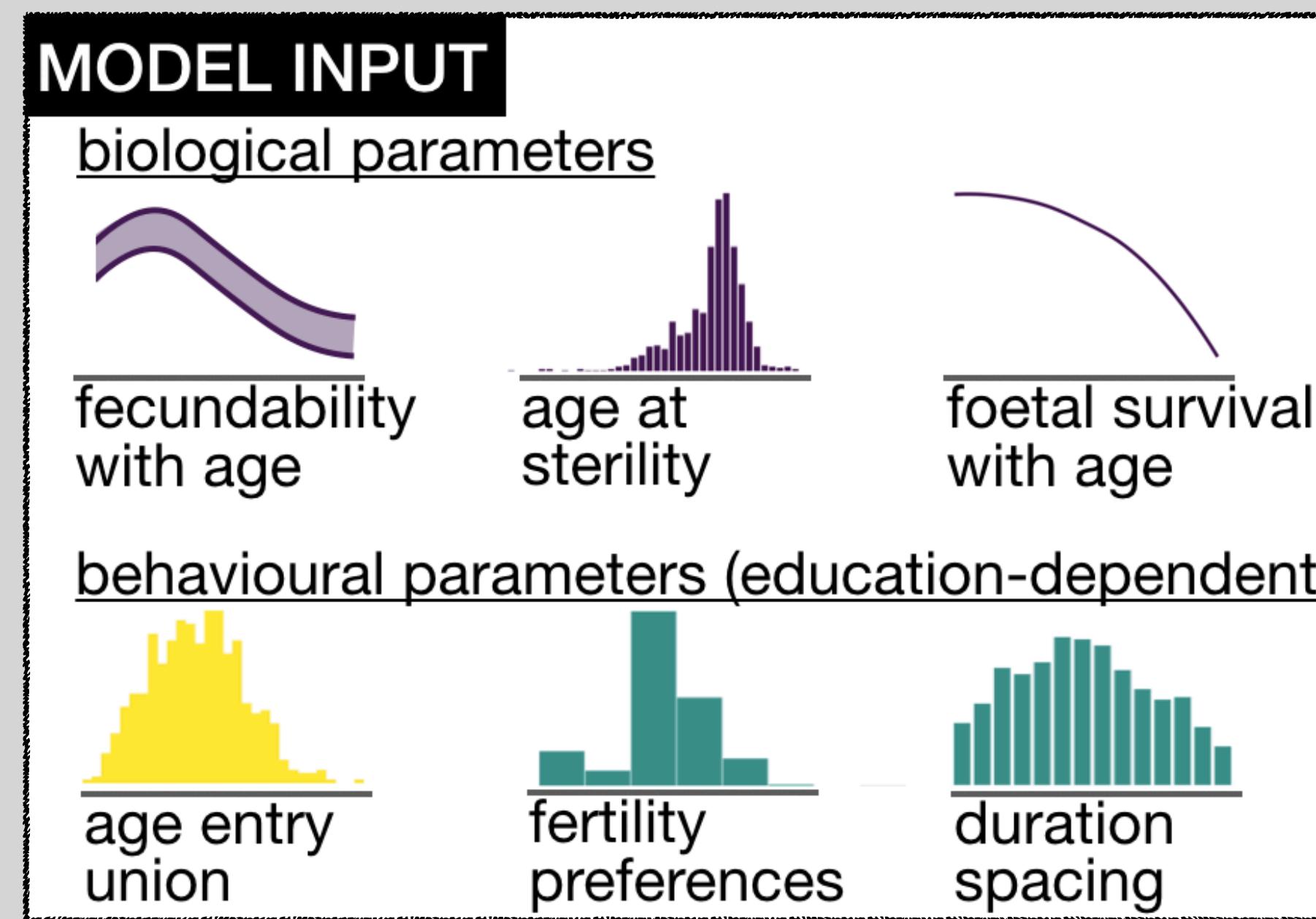
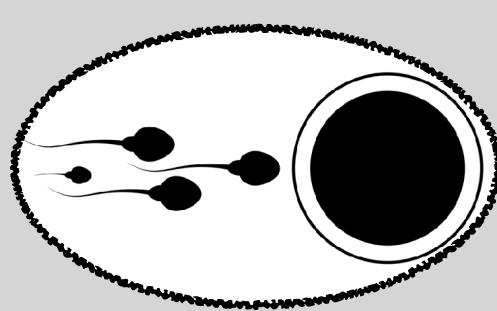


foetal survival
with age



Age start
conceiving



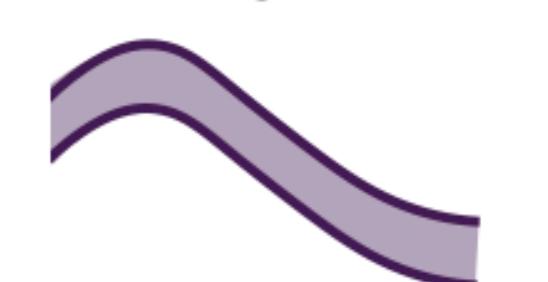


determines whether and when people would like to conceive

determines whether and when people conceive

MODEL INPUT

biological parameters



fecundability
with age



age at
sterility

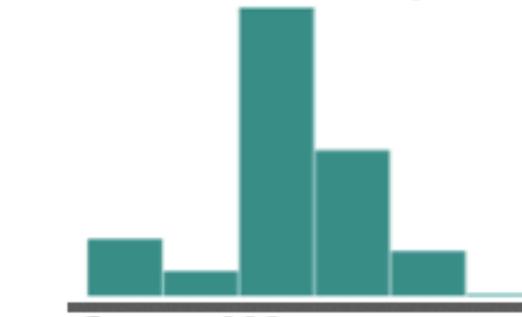


foetal survival
with age

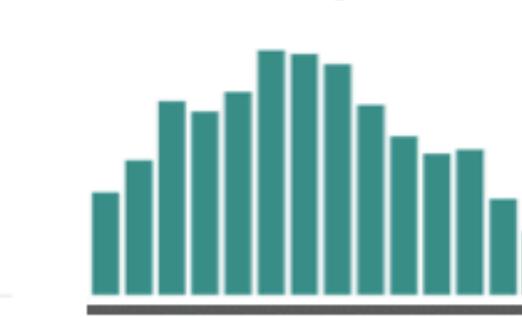
behavioural parameters (education-dependent)



age entry
union



fertility
preferences

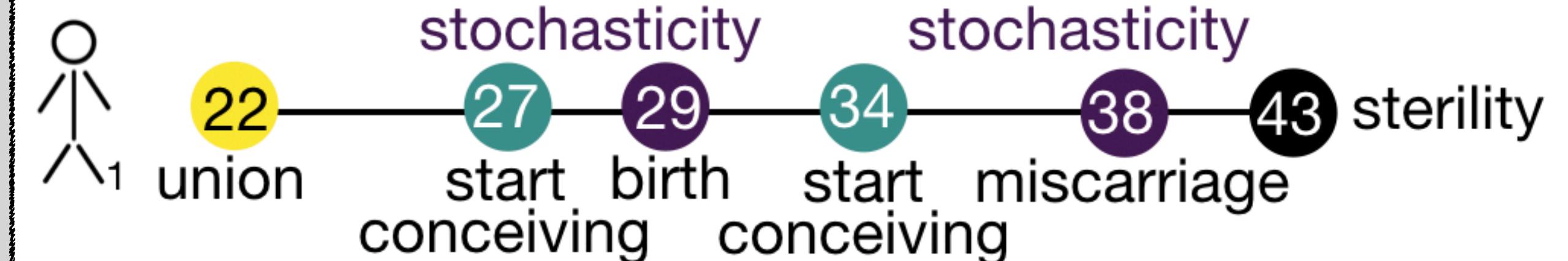


duration
spacing

MODEL RUN

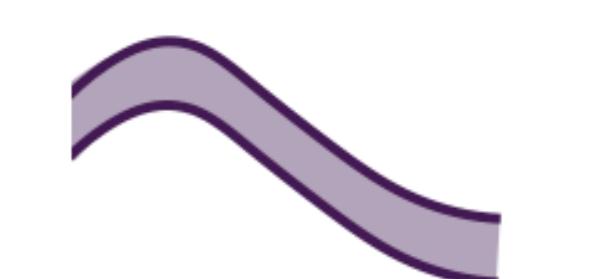
Randomly determined traits individual 1

in union =22 | spac. =5 | pref. =2 | fecund. =0.3 | steril. =43 | edu. =high



MODEL INPUT

biological parameters



fecundability
with age



age at
sterility



foetal survival
with age

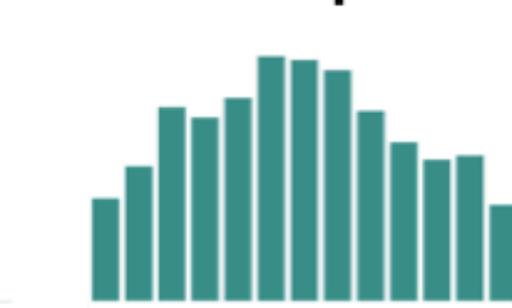
behavioural parameters (education-dependent)



age entry
union



fertility
preferences

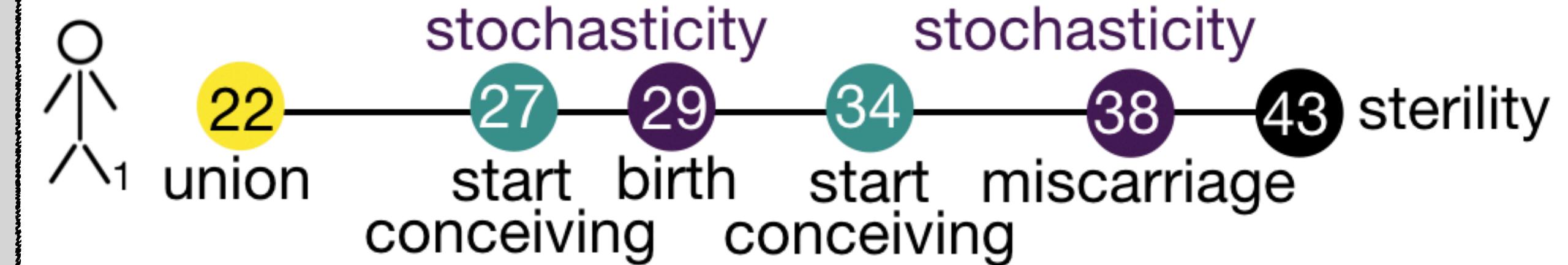


duration
spacing

MODEL RUN

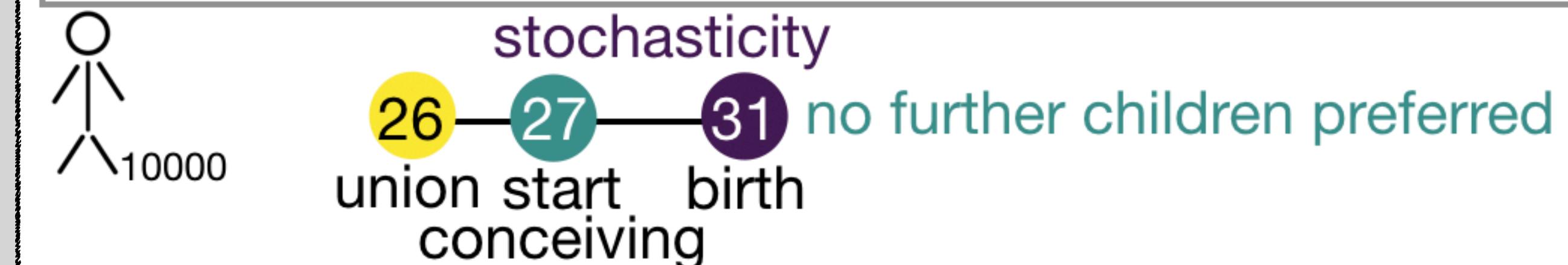
Randomly determined traits individual 1

in union =22 | spac. =5 | pref. =2 | fecund. =0.3 | steril. =43 | edu. =high



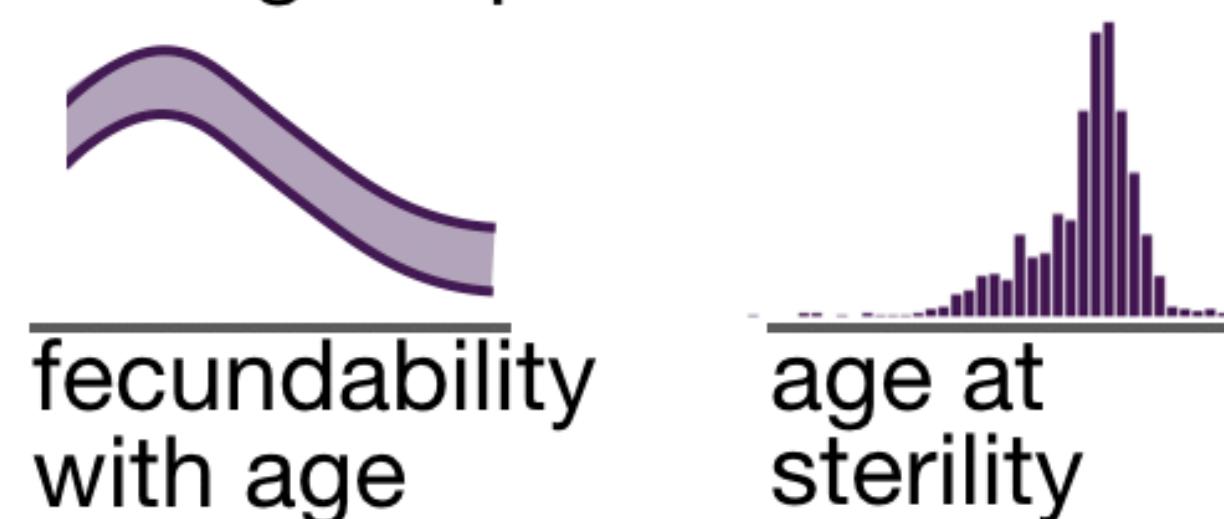
Randomly determined traits individual 10000

in union =26 | spac. =1 | pref. =1 | fecund. =0.1 | steril. =45 | edu. =low

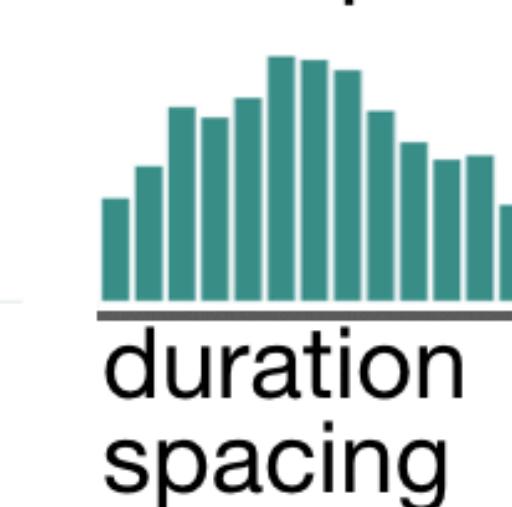


MODEL INPUT

biological parameters



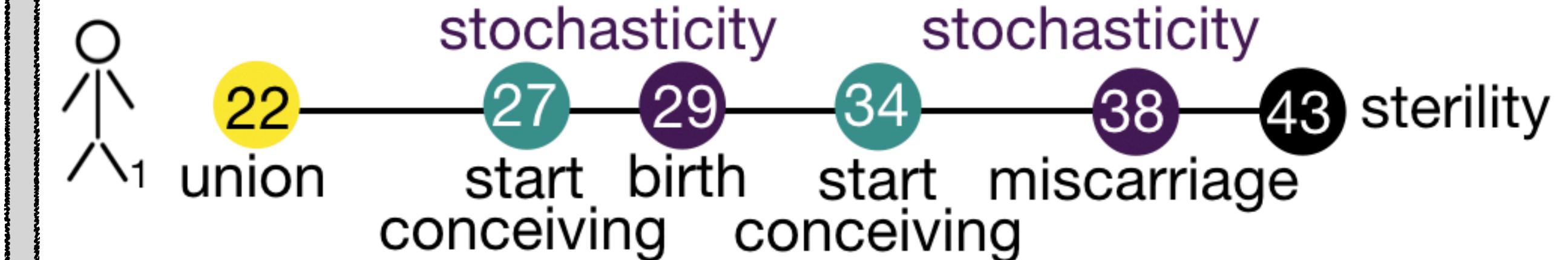
behavioural parameters (education-dependent)



MODEL RUN

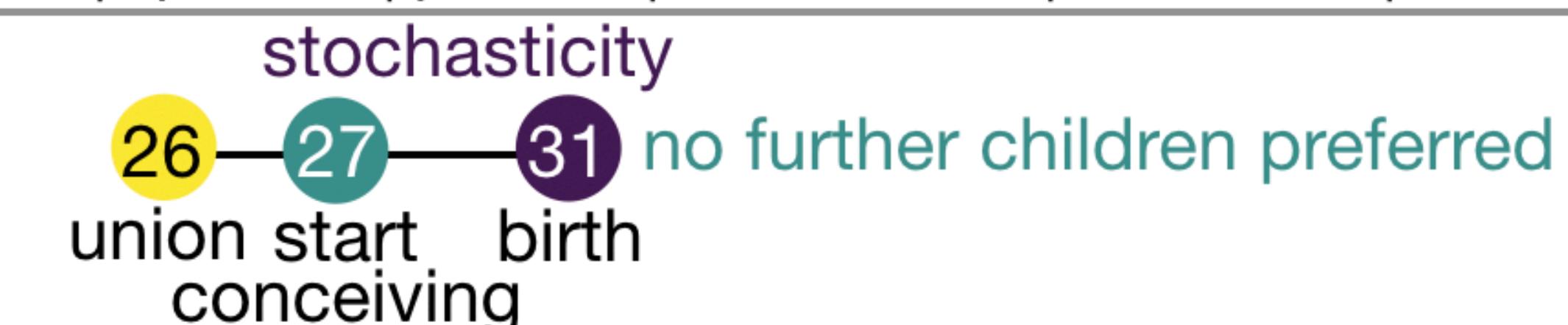
Randomly determined traits individual 1

in union =22 | spac. =5 | pref. =2 | fecund. =0.3 | steril. =43 | edu. =high



Randomly determined traits individual 10000

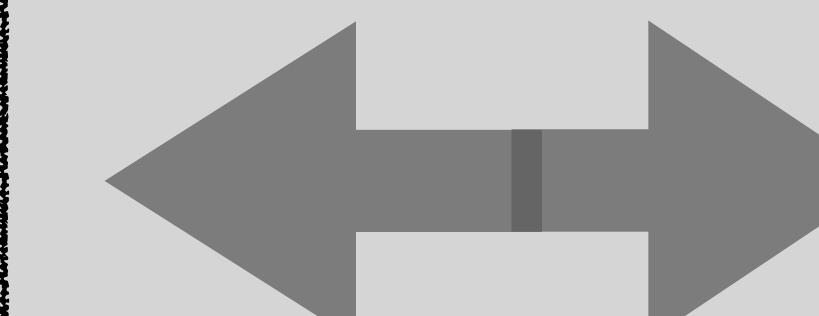
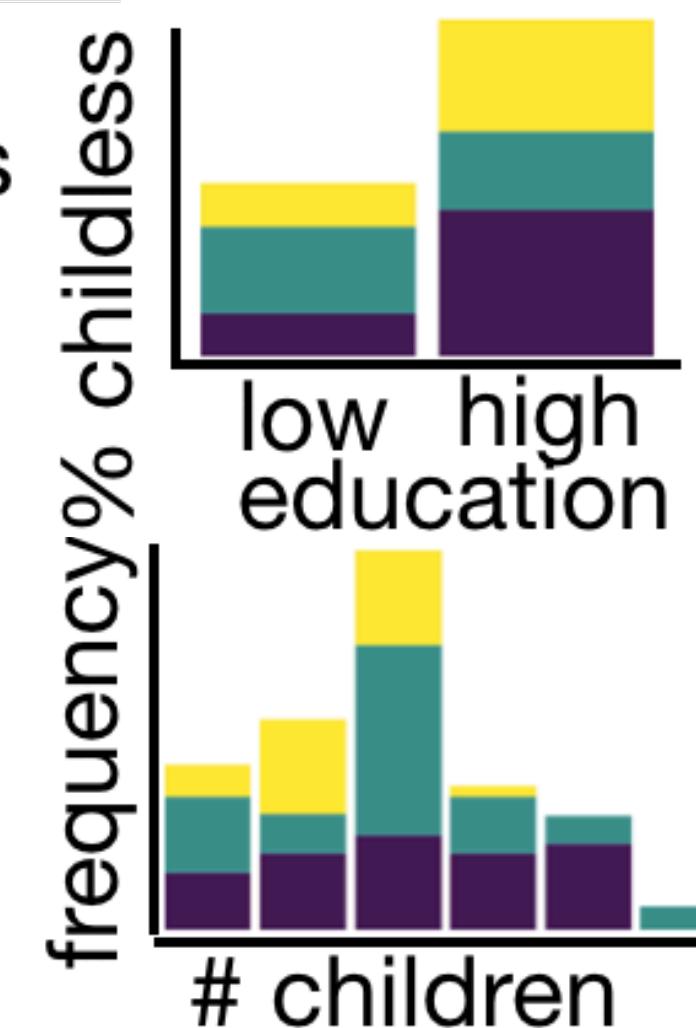
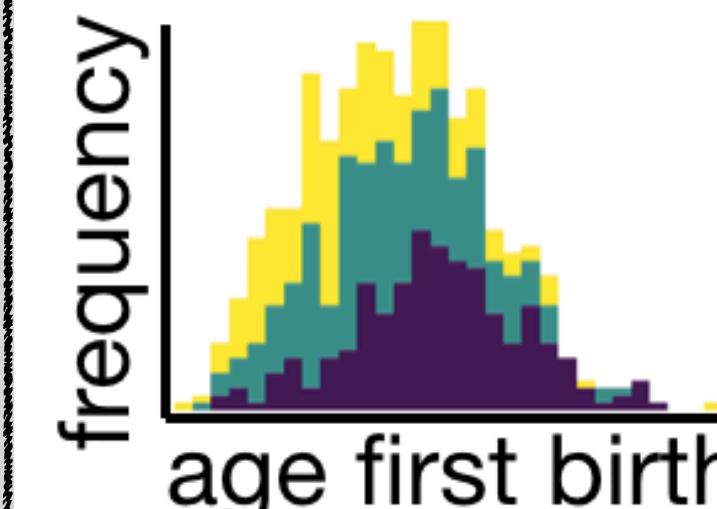
in union =26 | spac. =1 | pref. =1 | fecund. =0.1 | steril. =45 | edu. =low



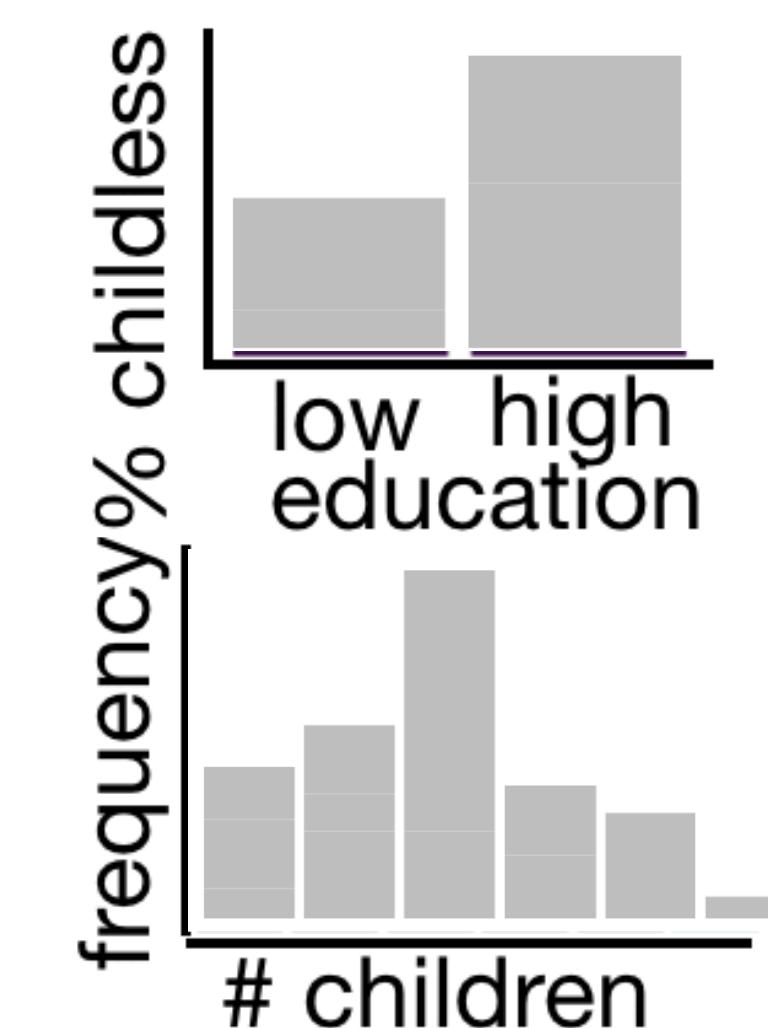
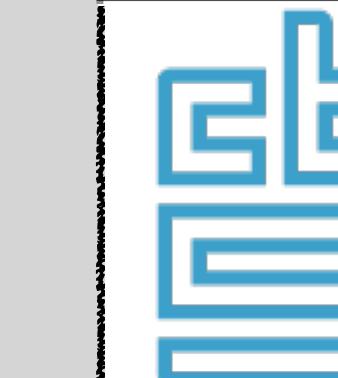
MODEL OUTPUT

due to:

- partner status
- preferences
- stochasticity



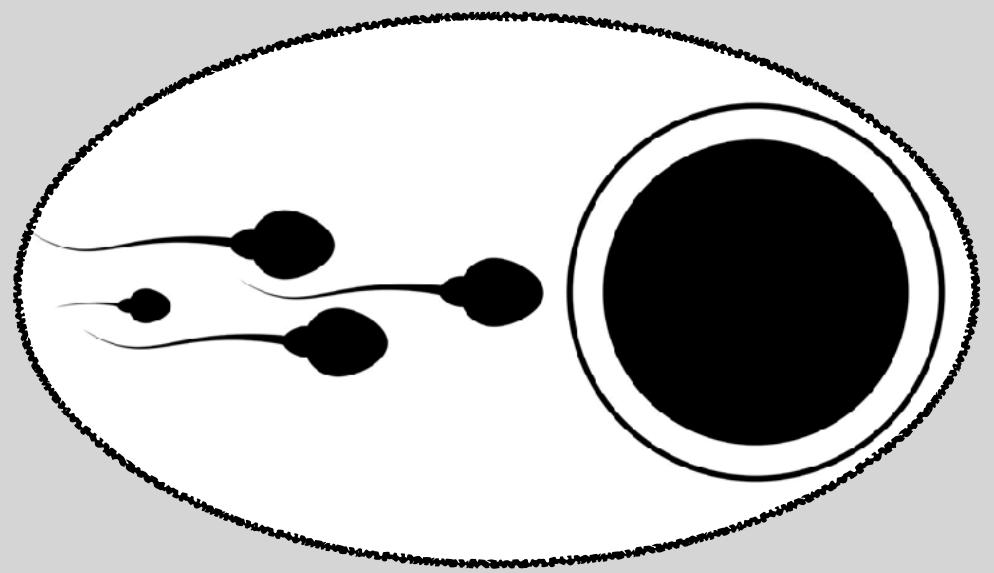
'TRUTH'



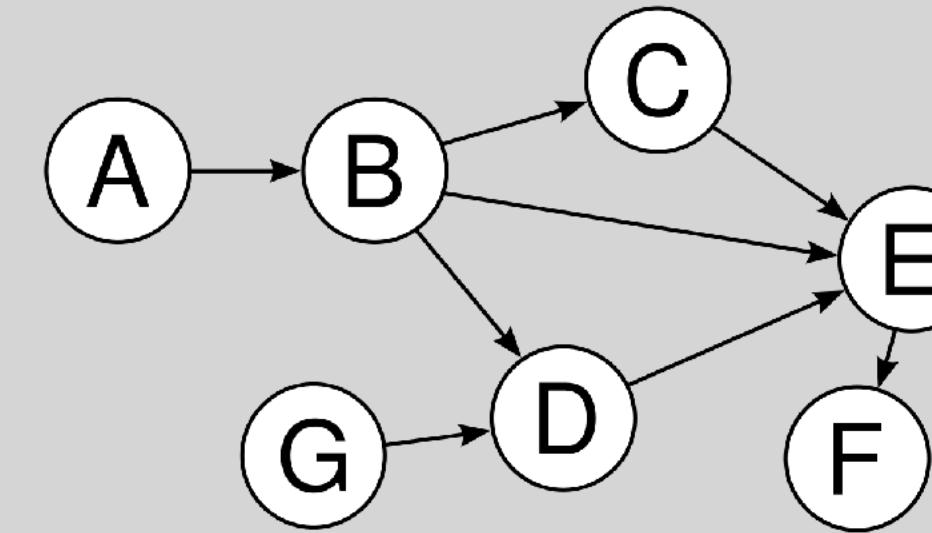
Take-Home Messages

microsimulation
can advance
sociological research

microsimulation can:



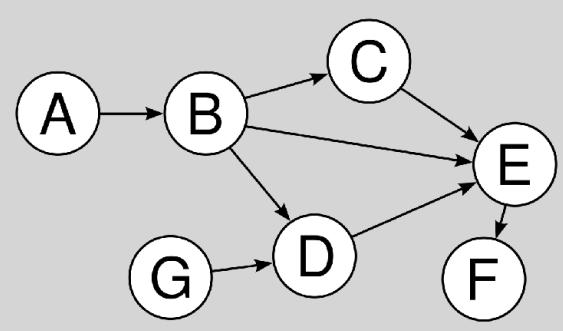
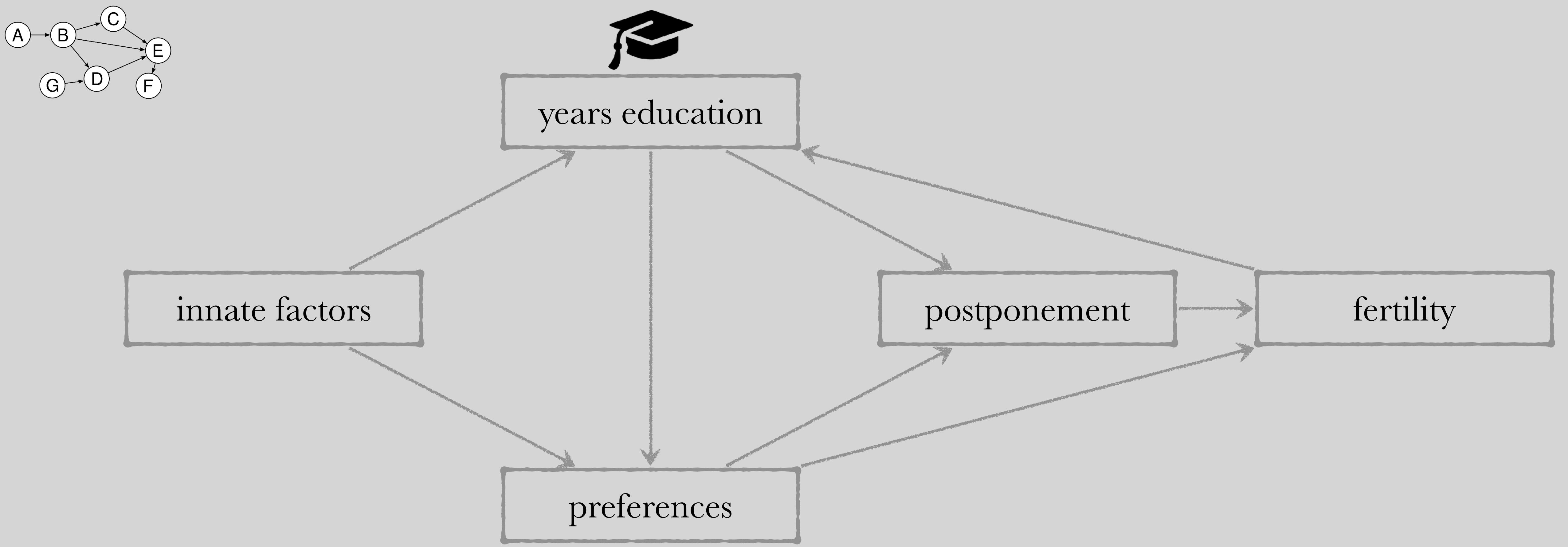
include
biological
information



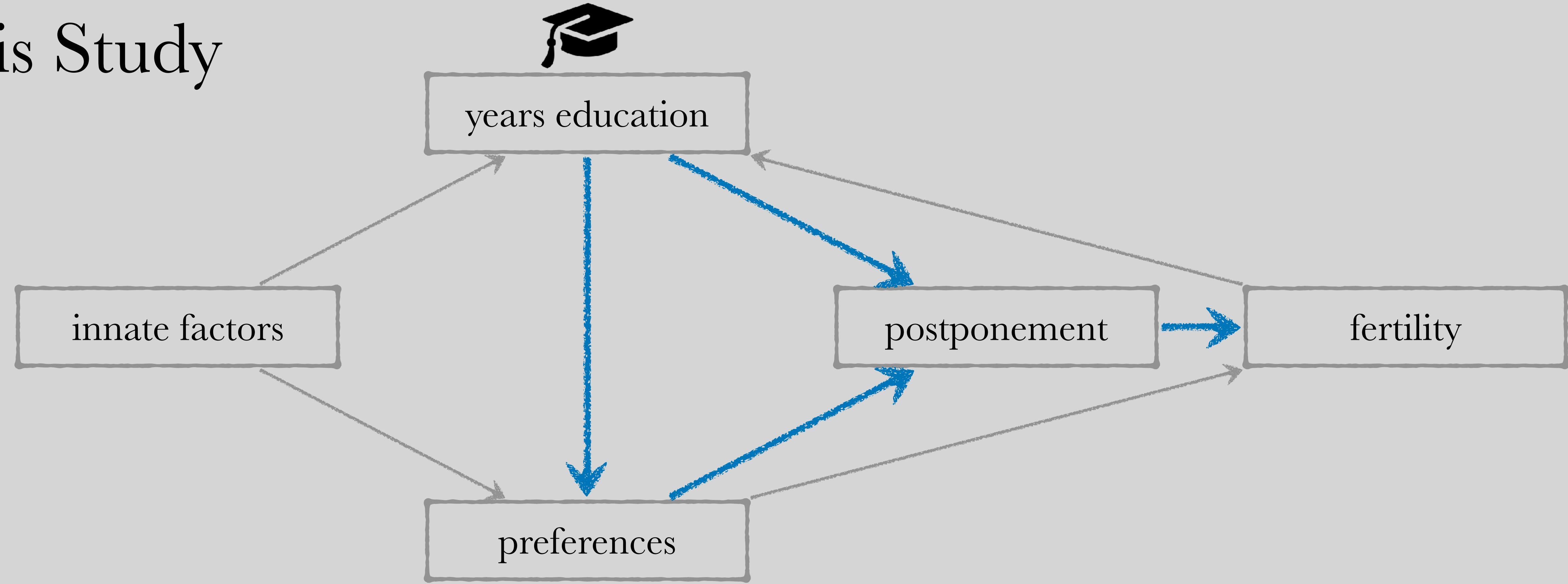
test (causal)
mechanisms

{ ABC }

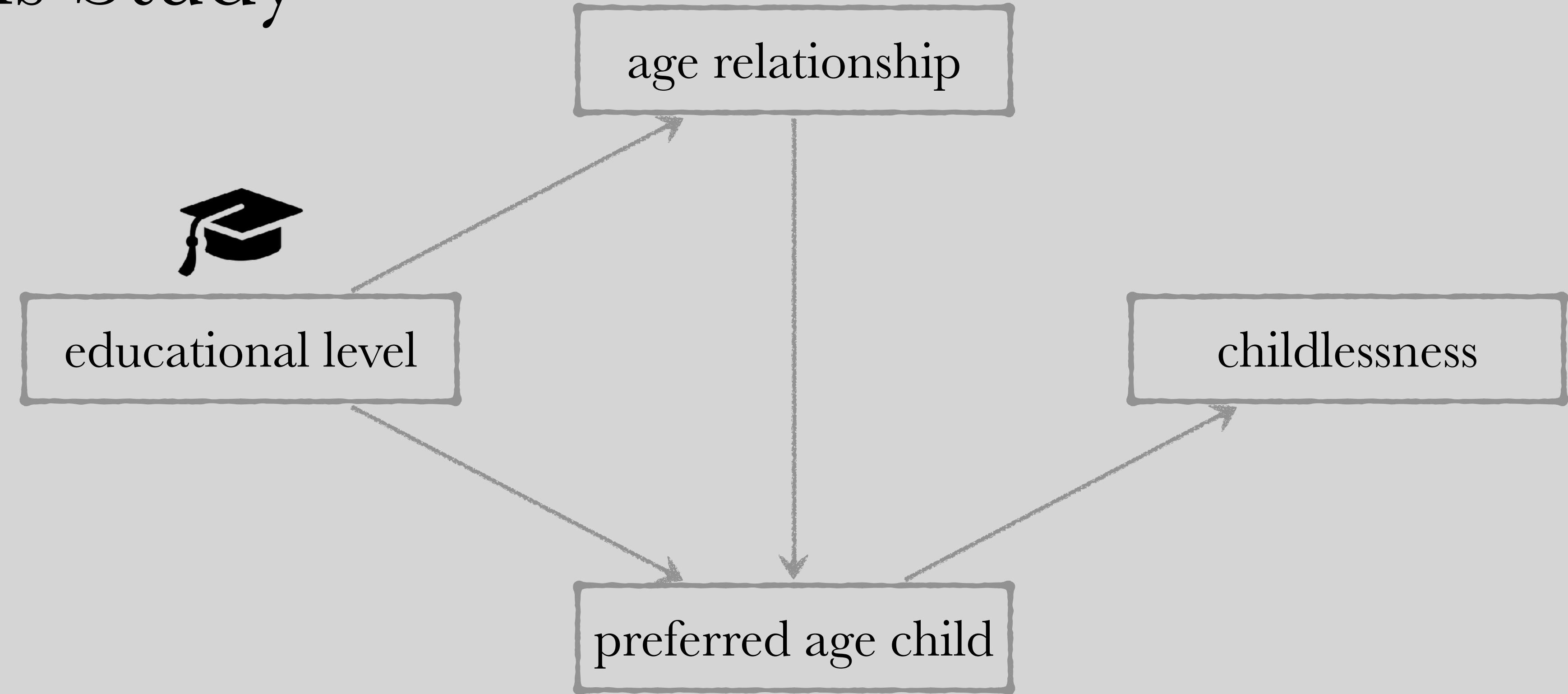
estimate unknown
parameters

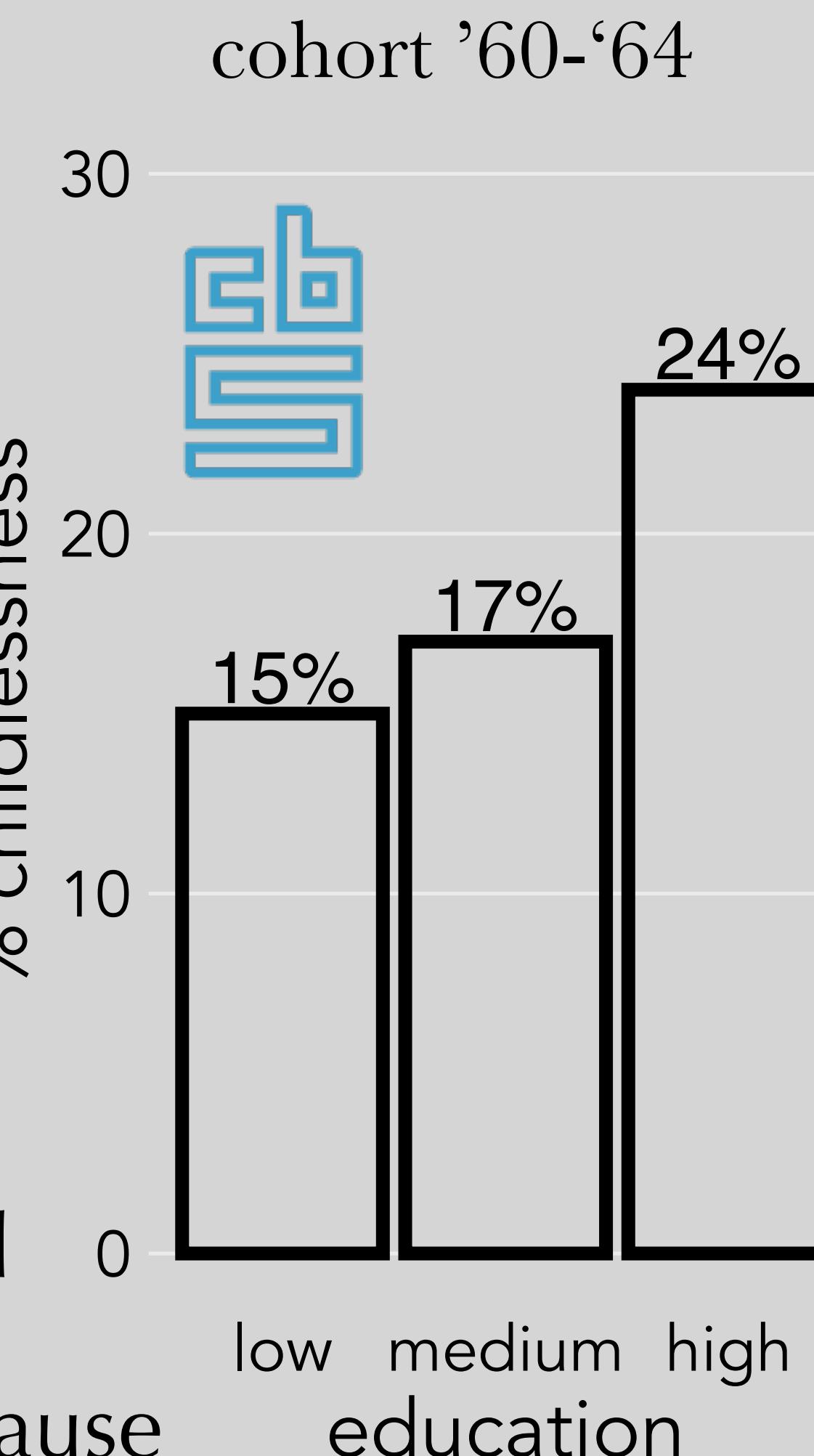
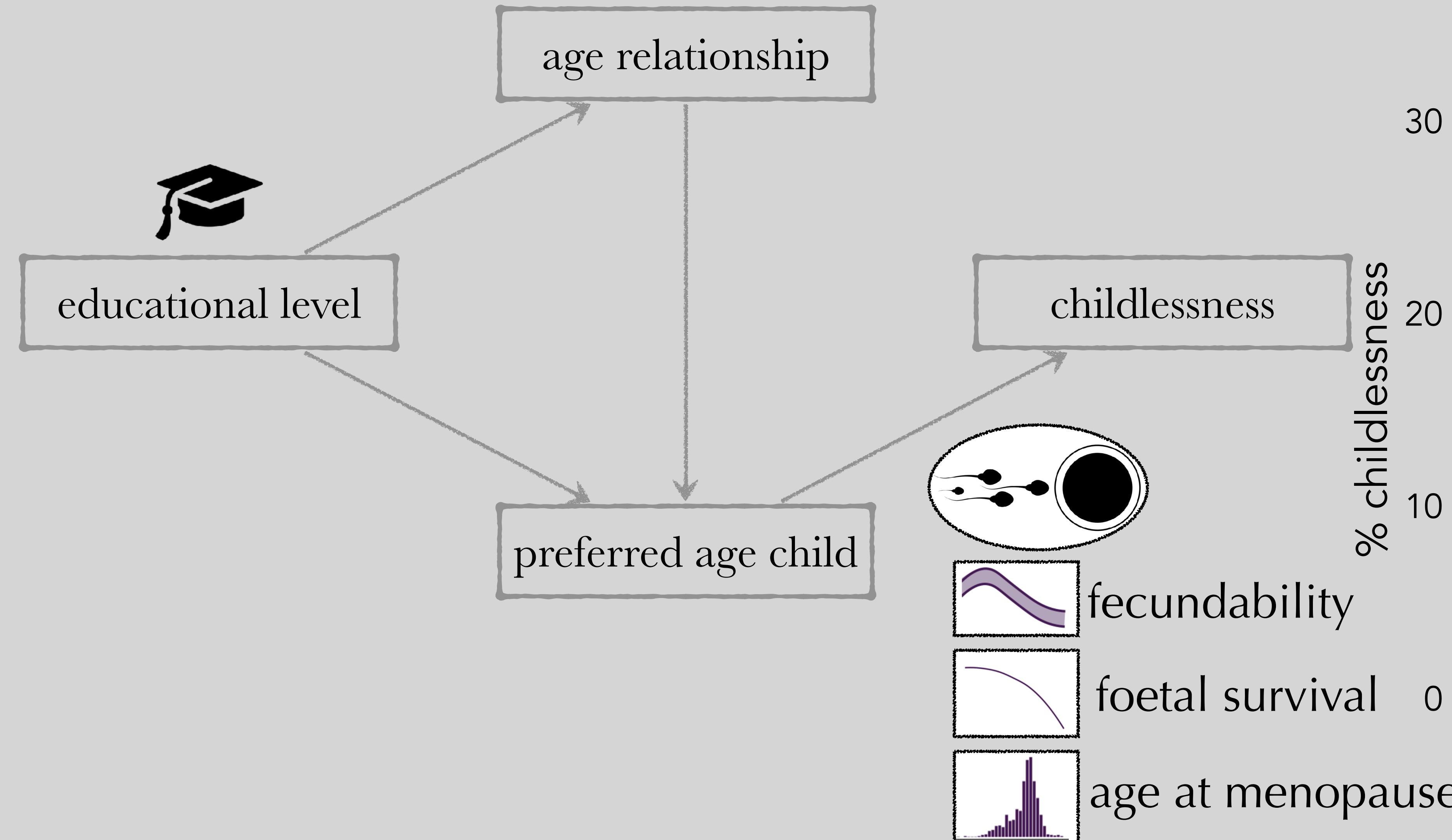


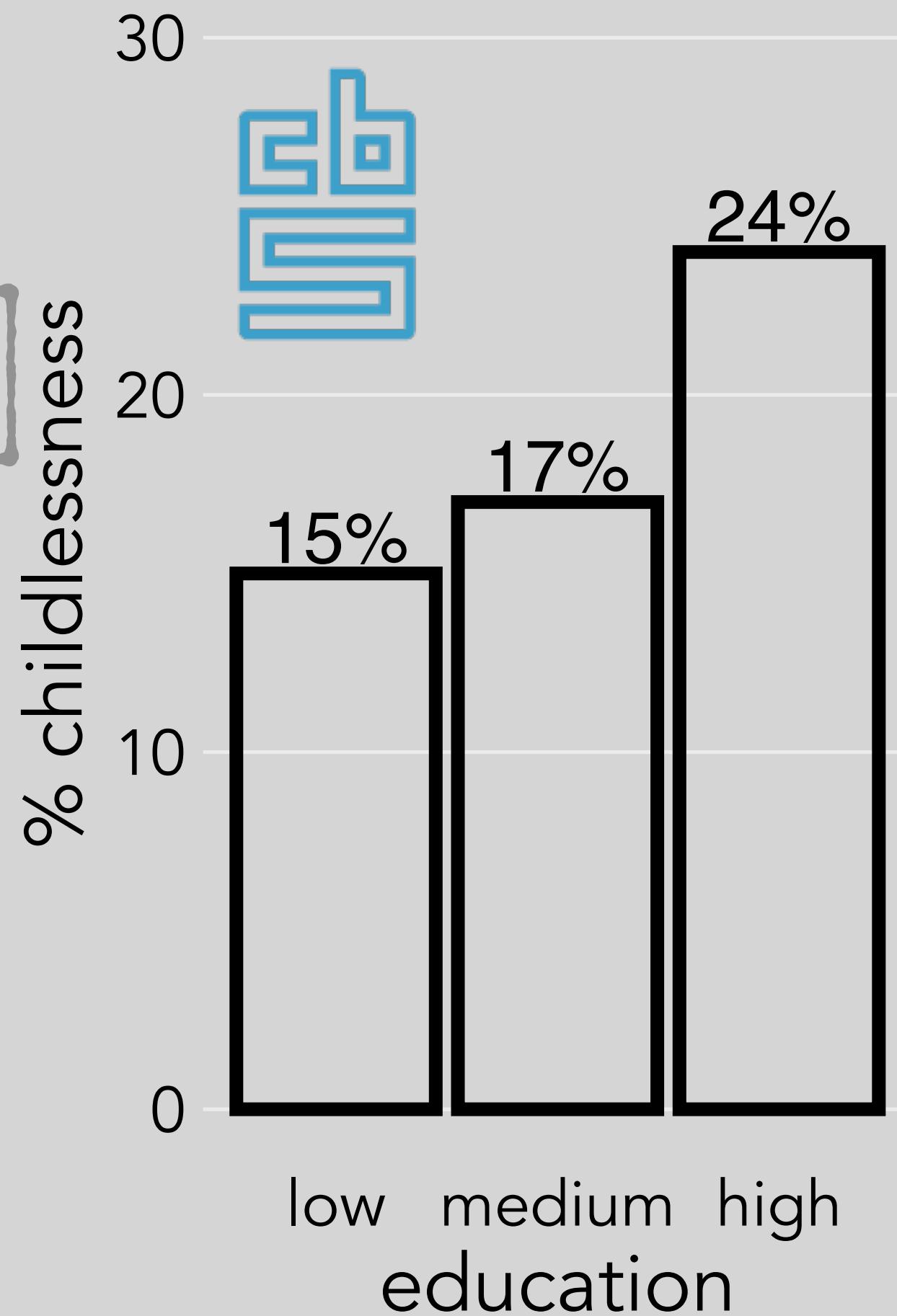
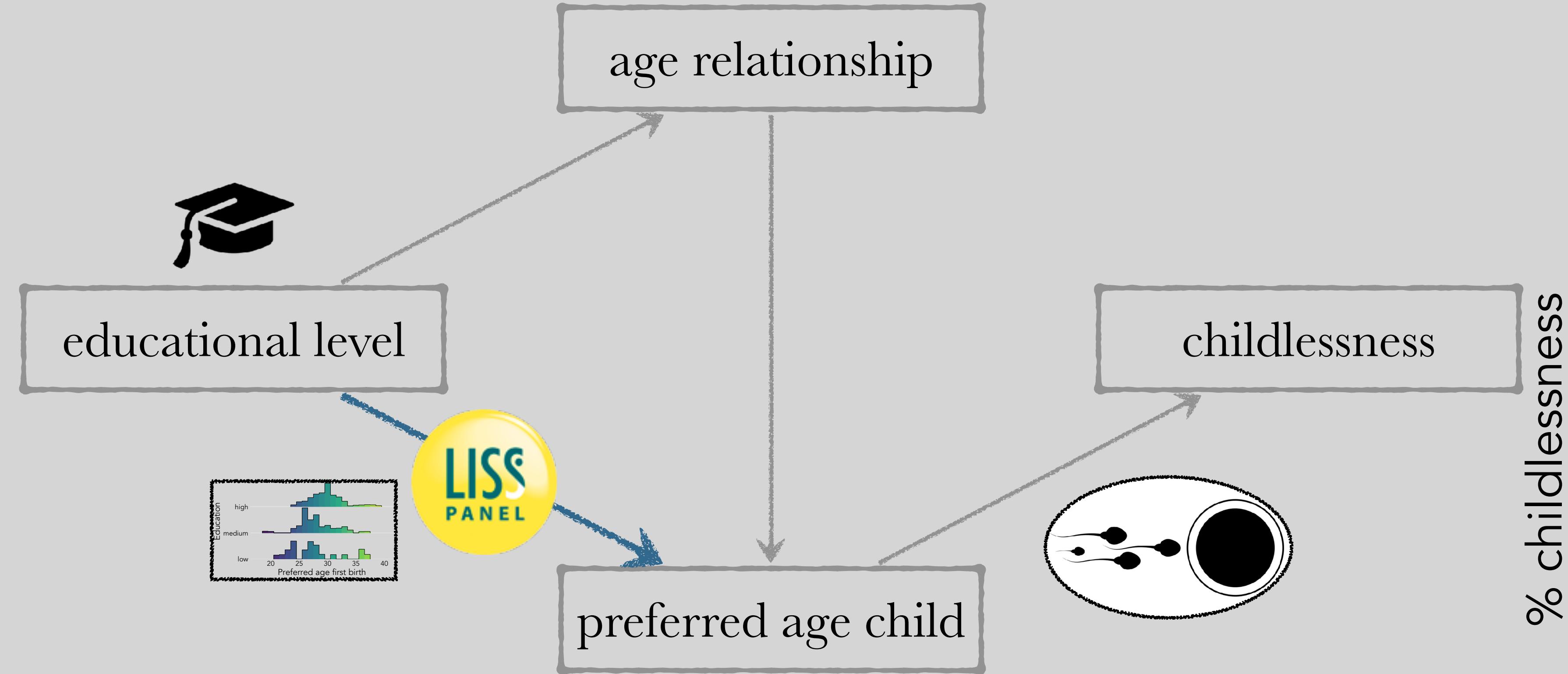
This Study

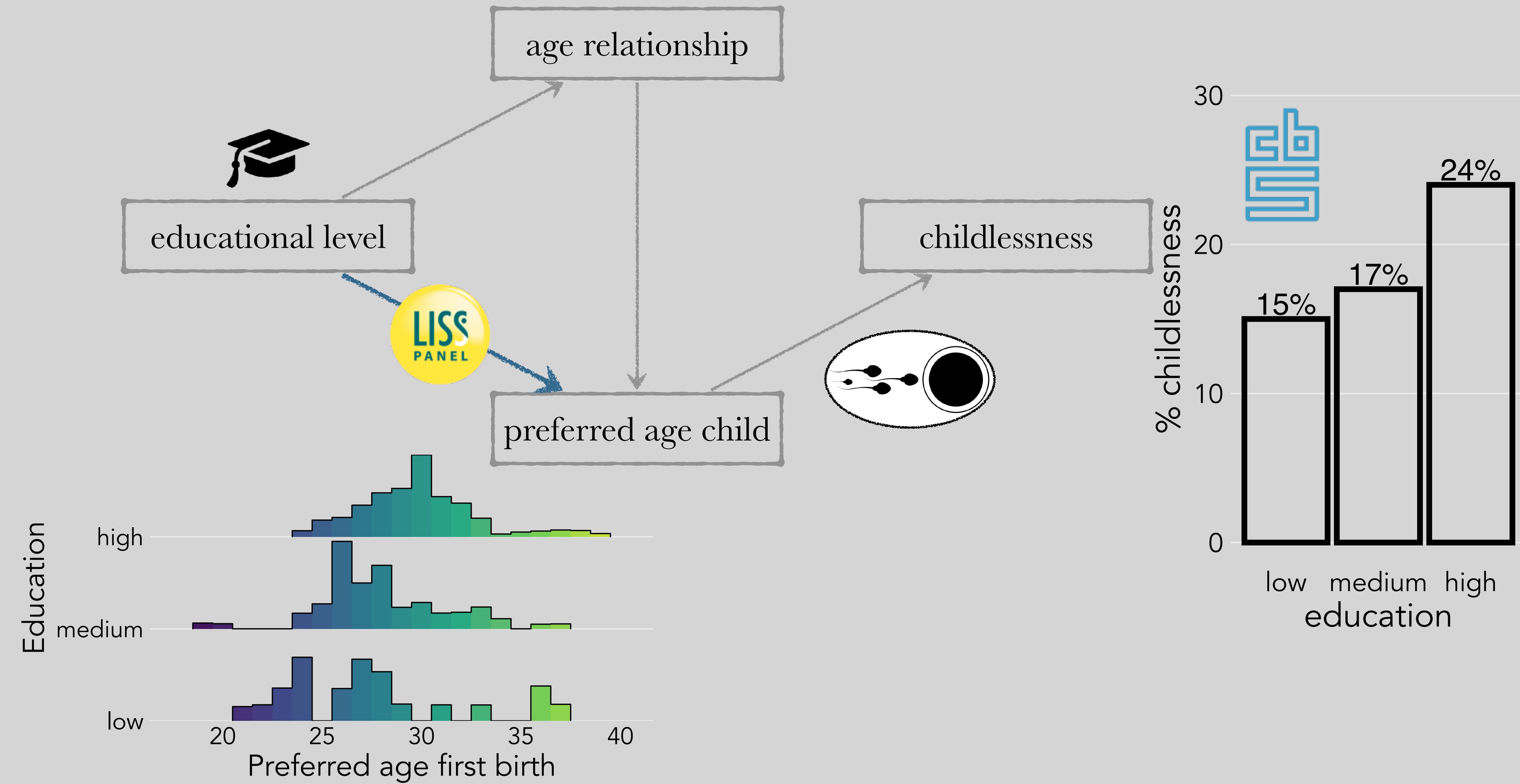


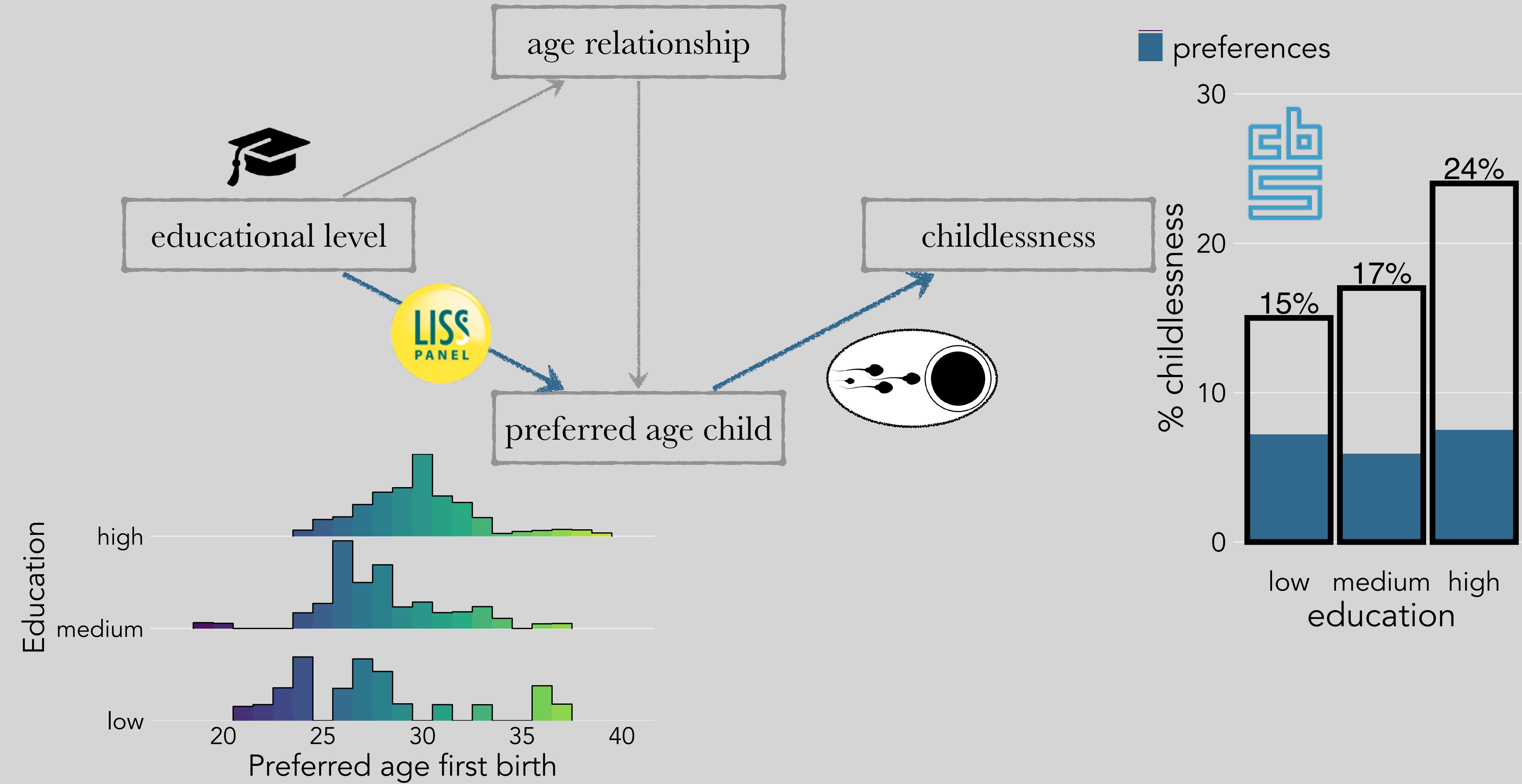
This Study

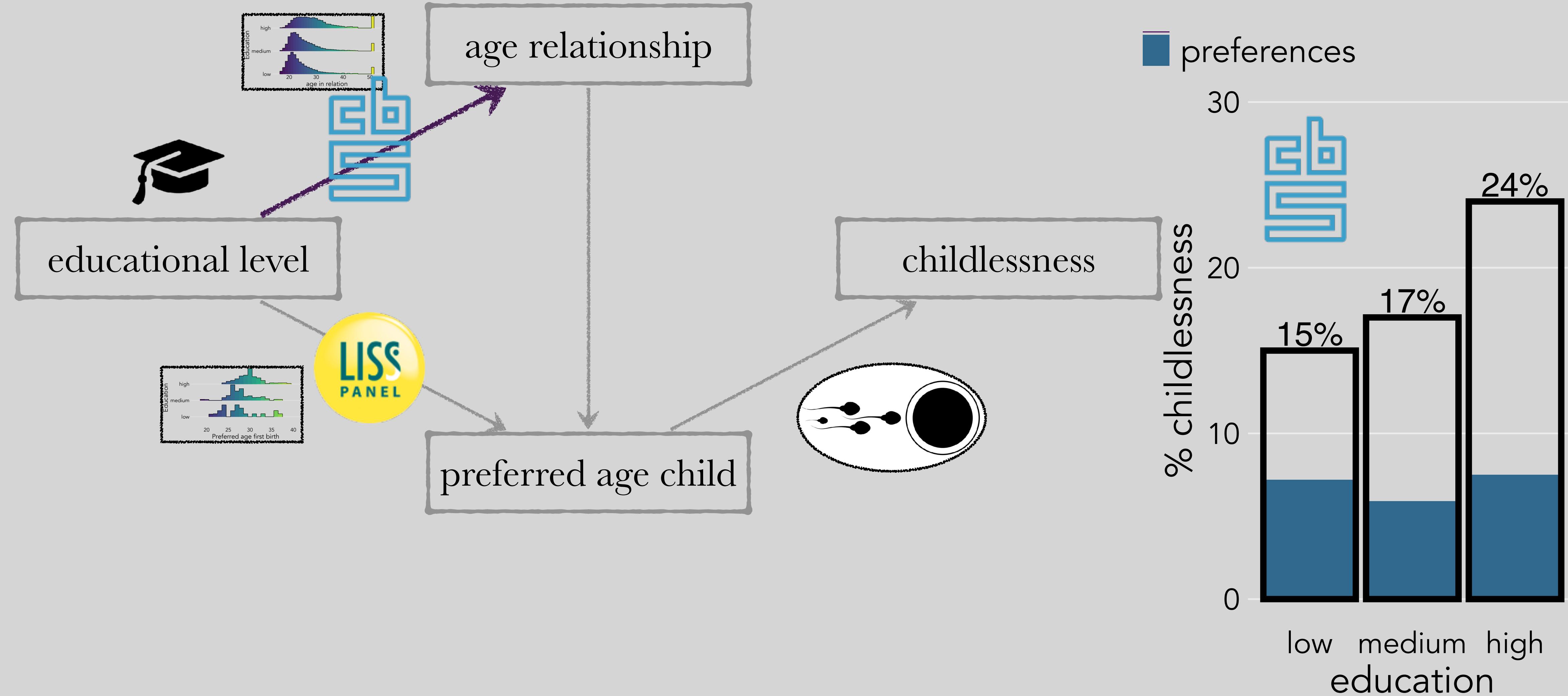


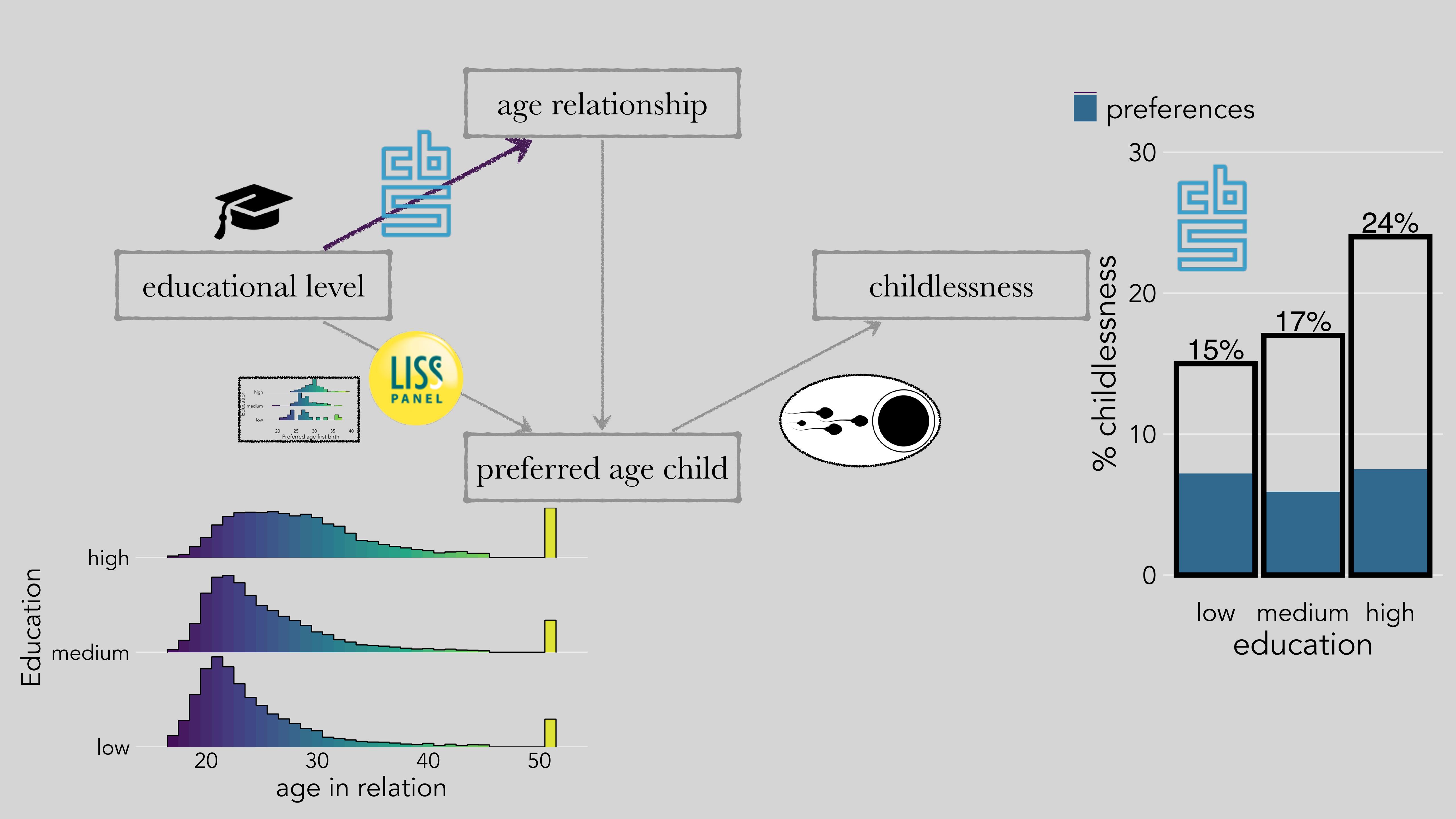


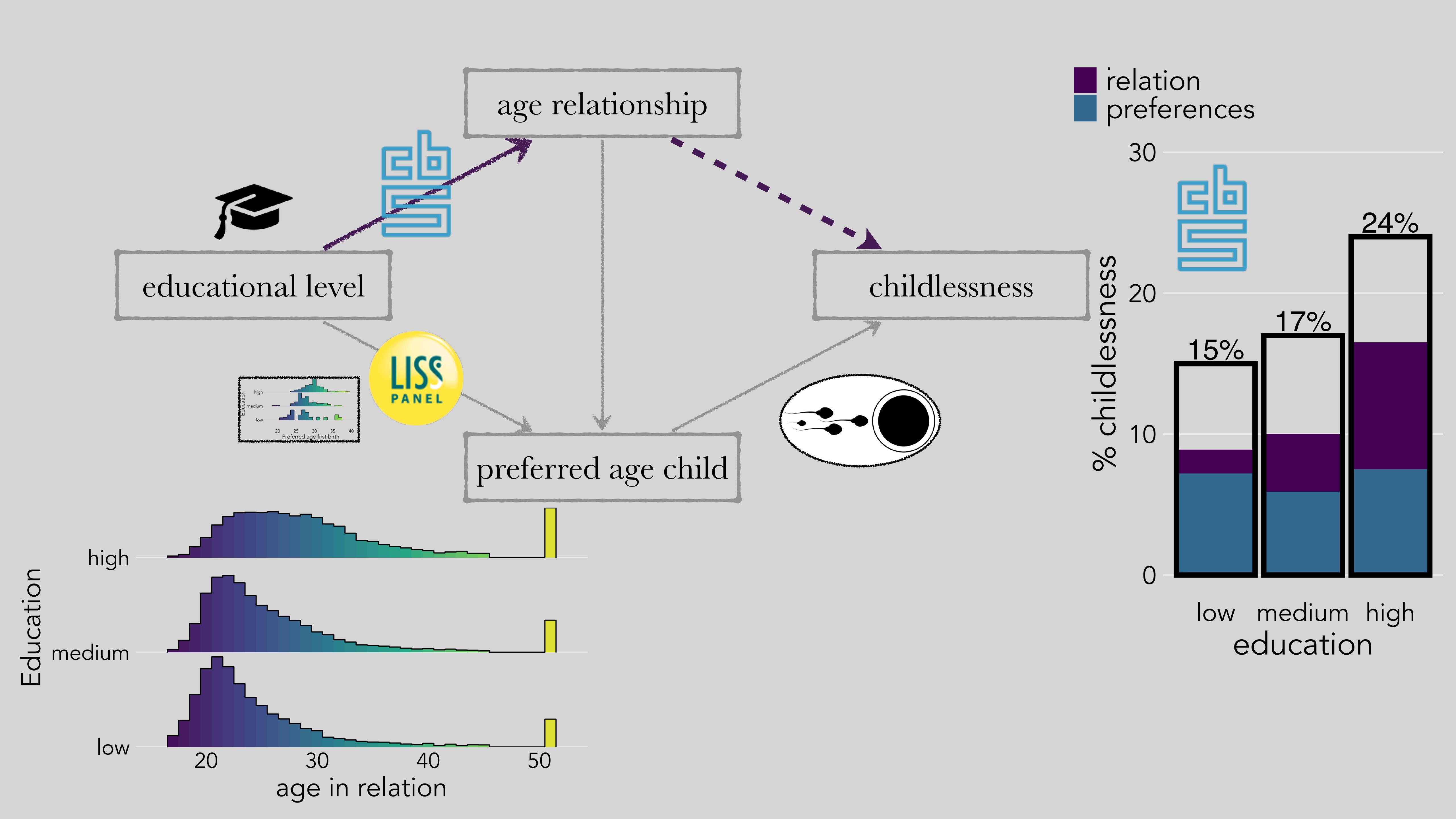




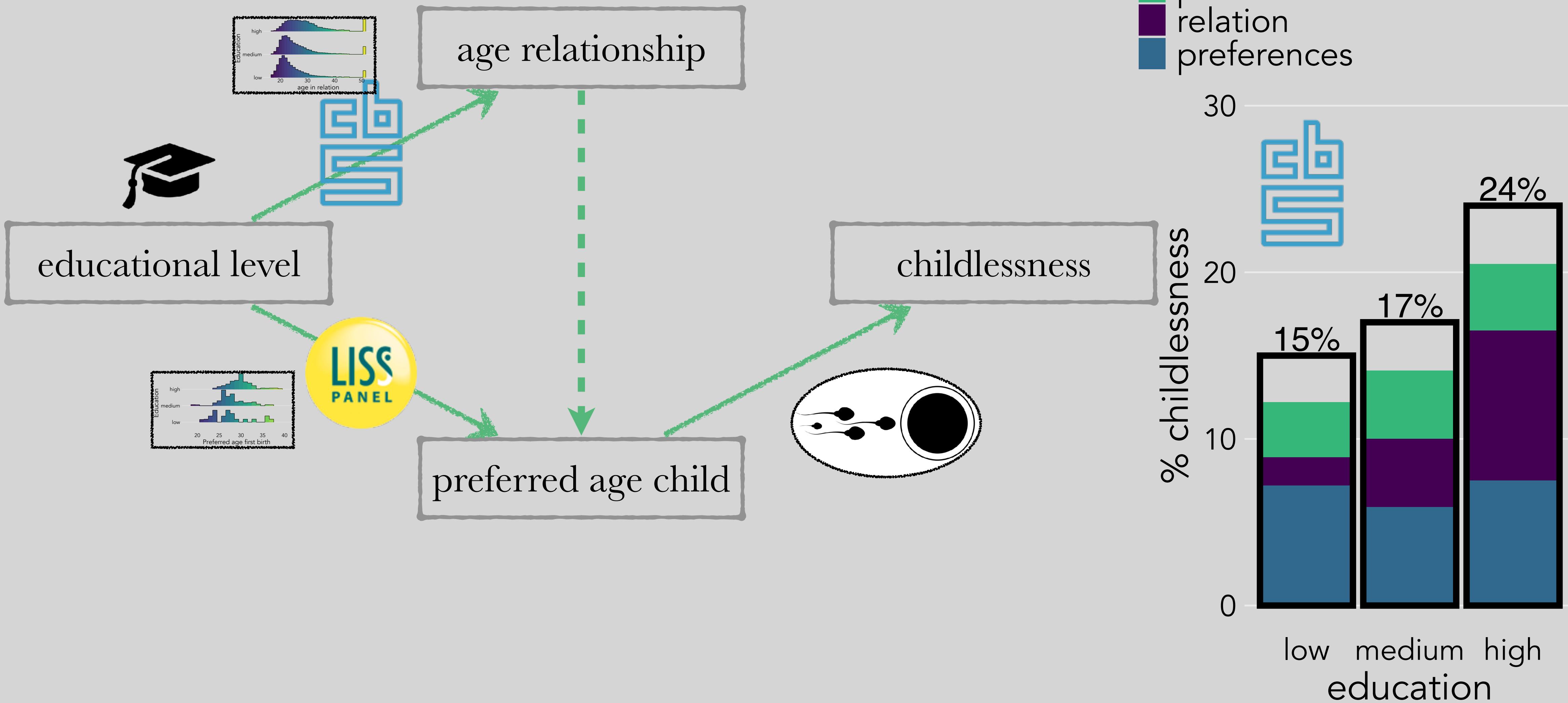




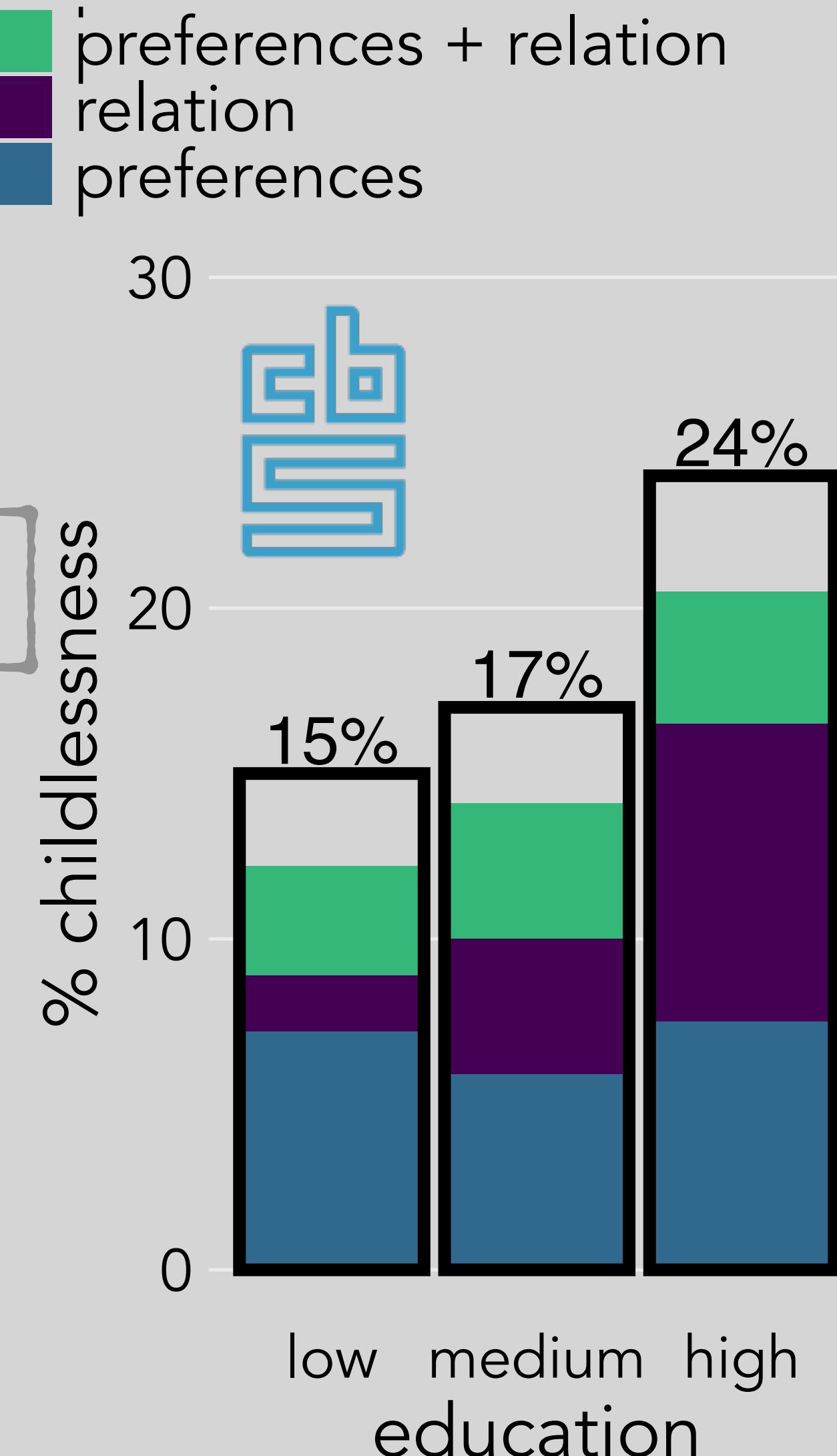
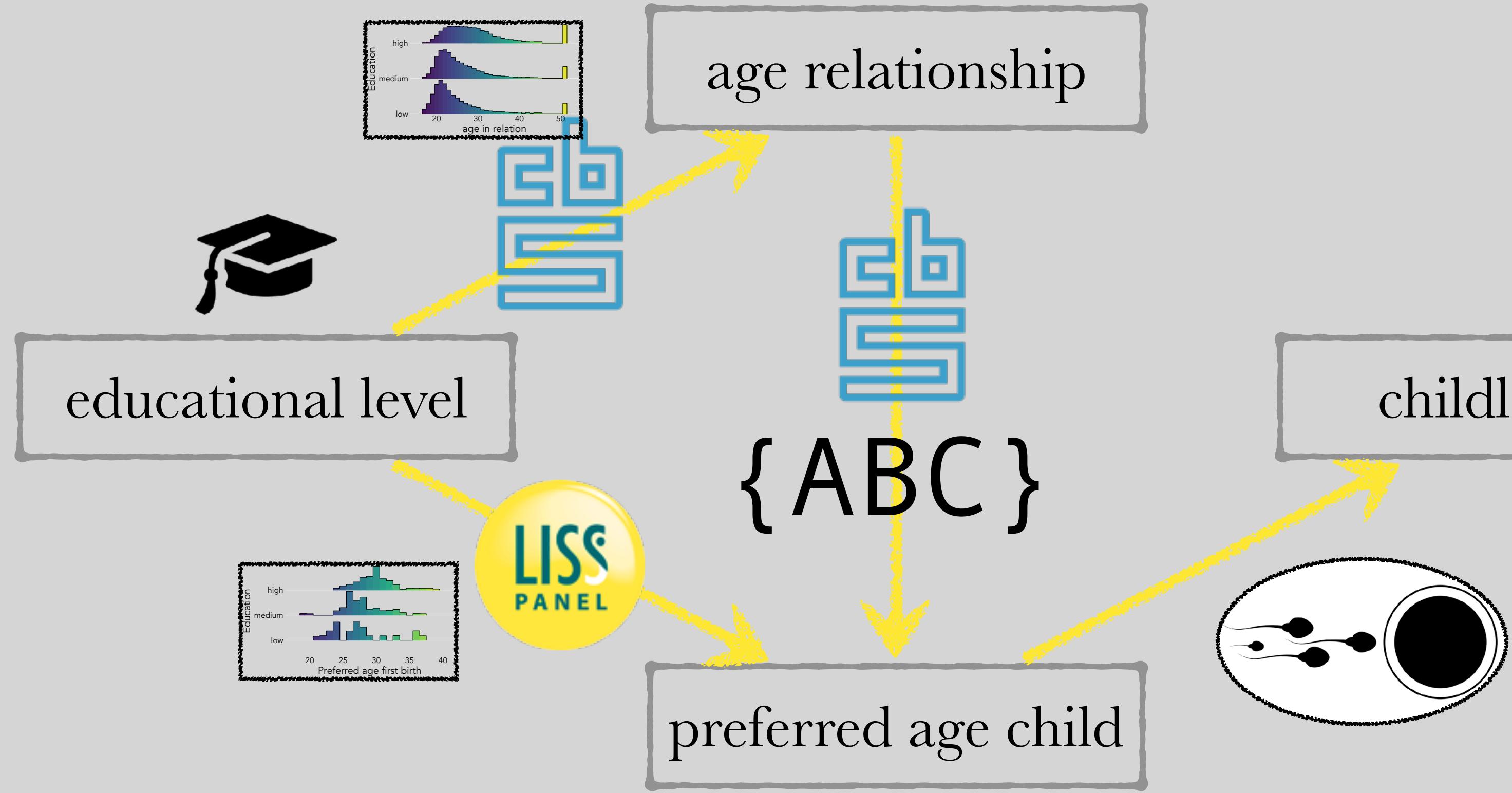




 preferences + relation
 relation
 preferences

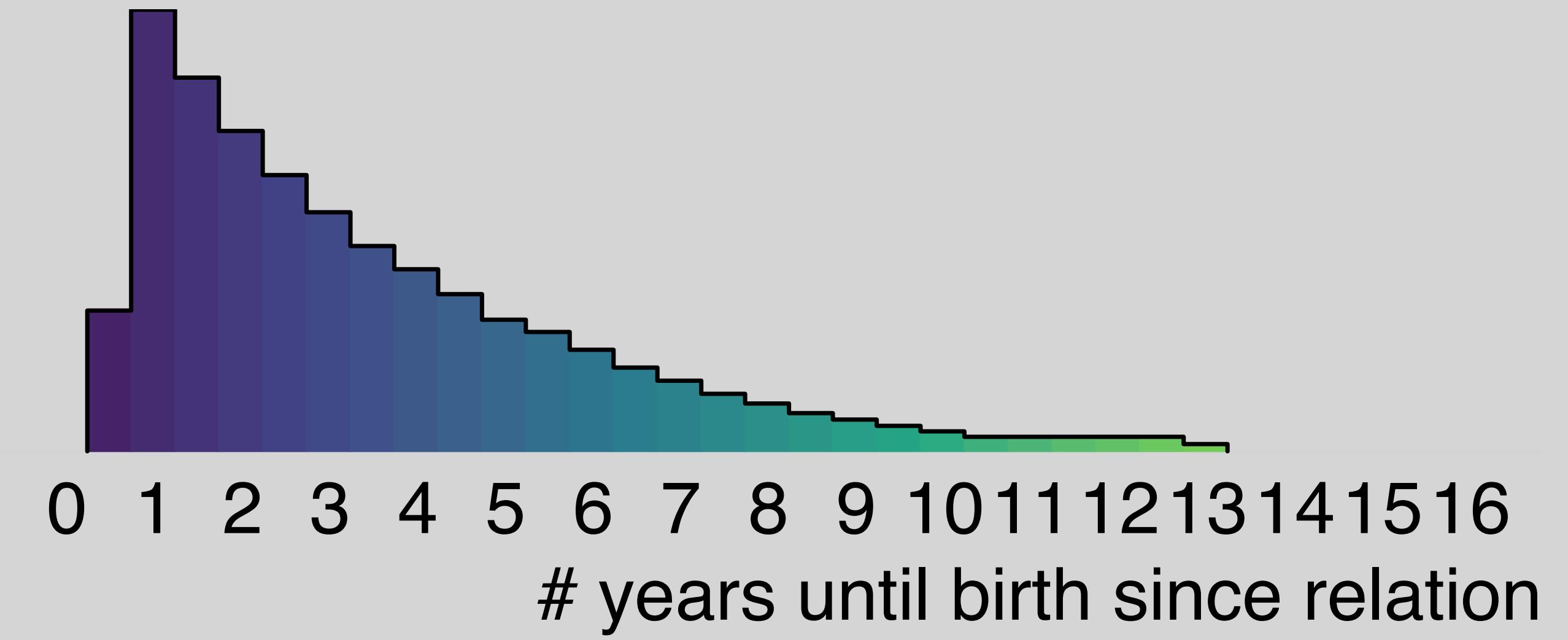
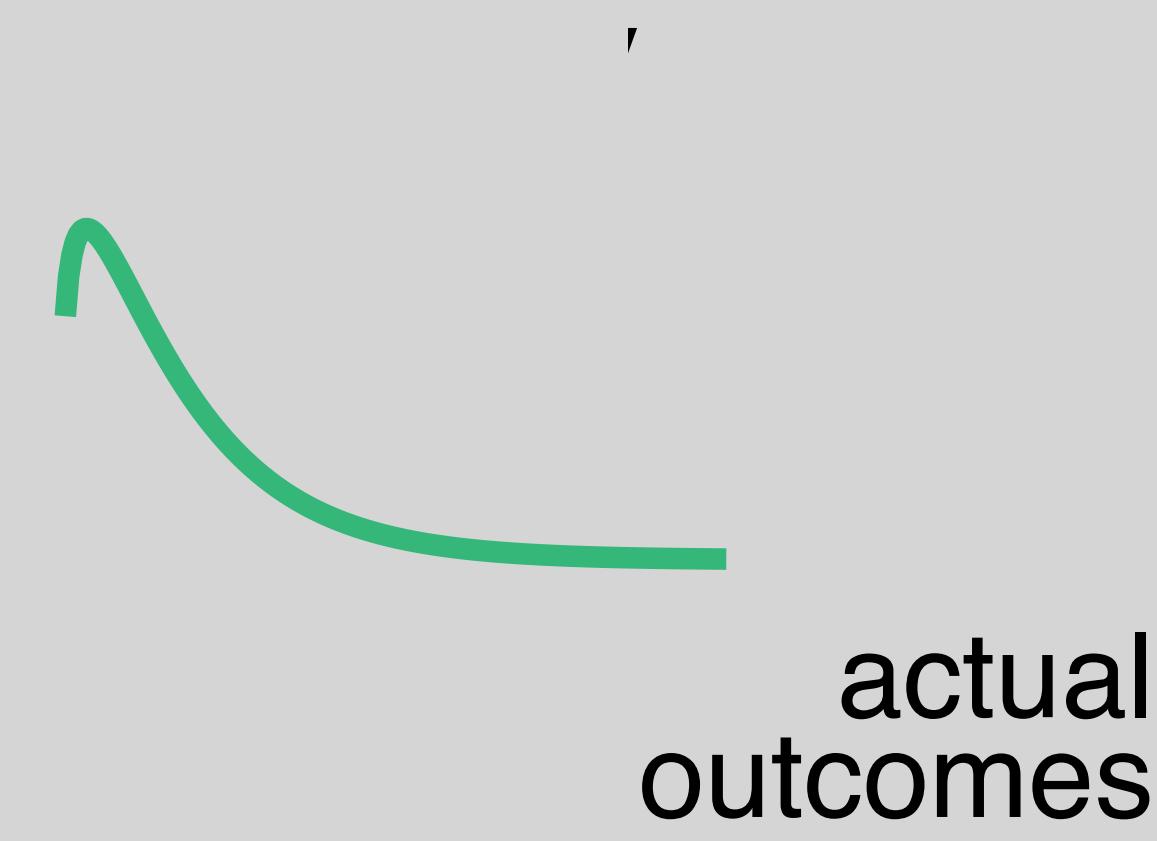


{ABC} Approximate Bayesian Computation

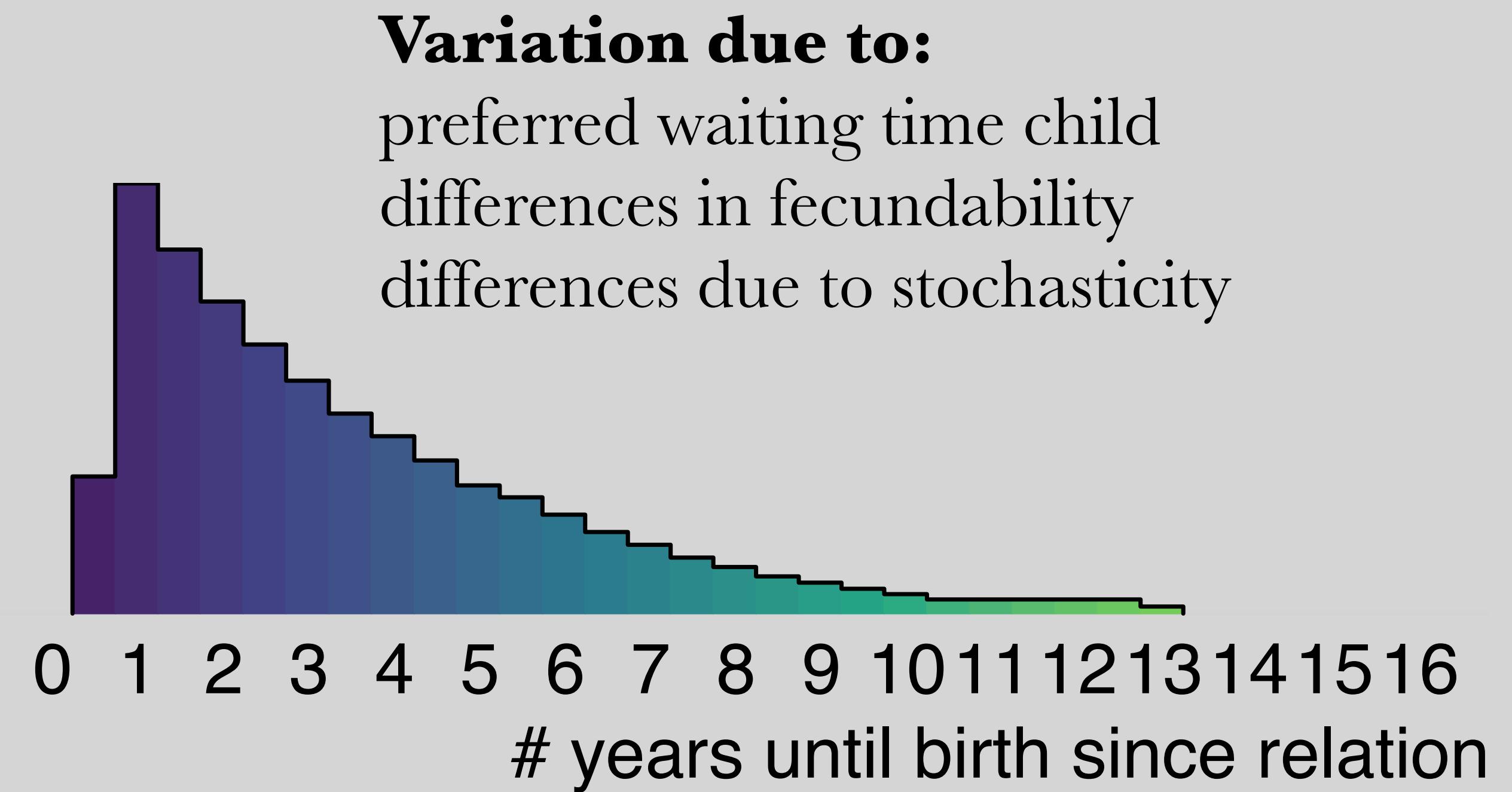
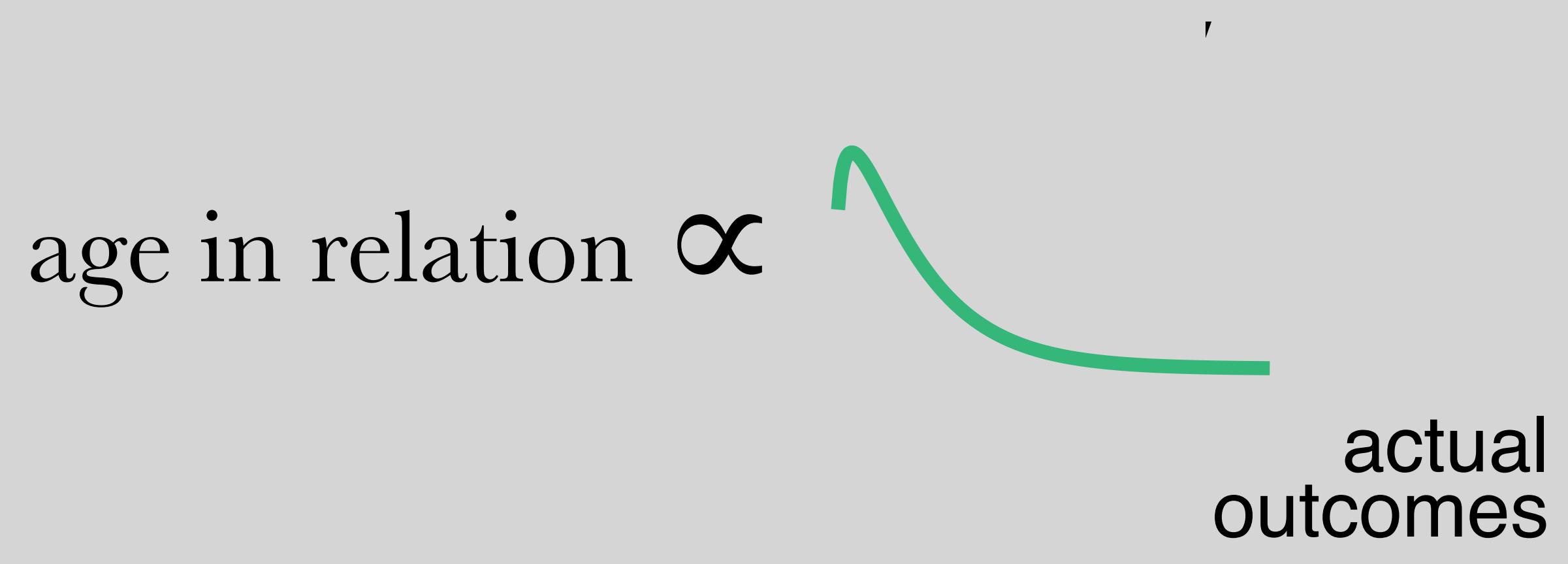


{ABC}

age in relation \propto

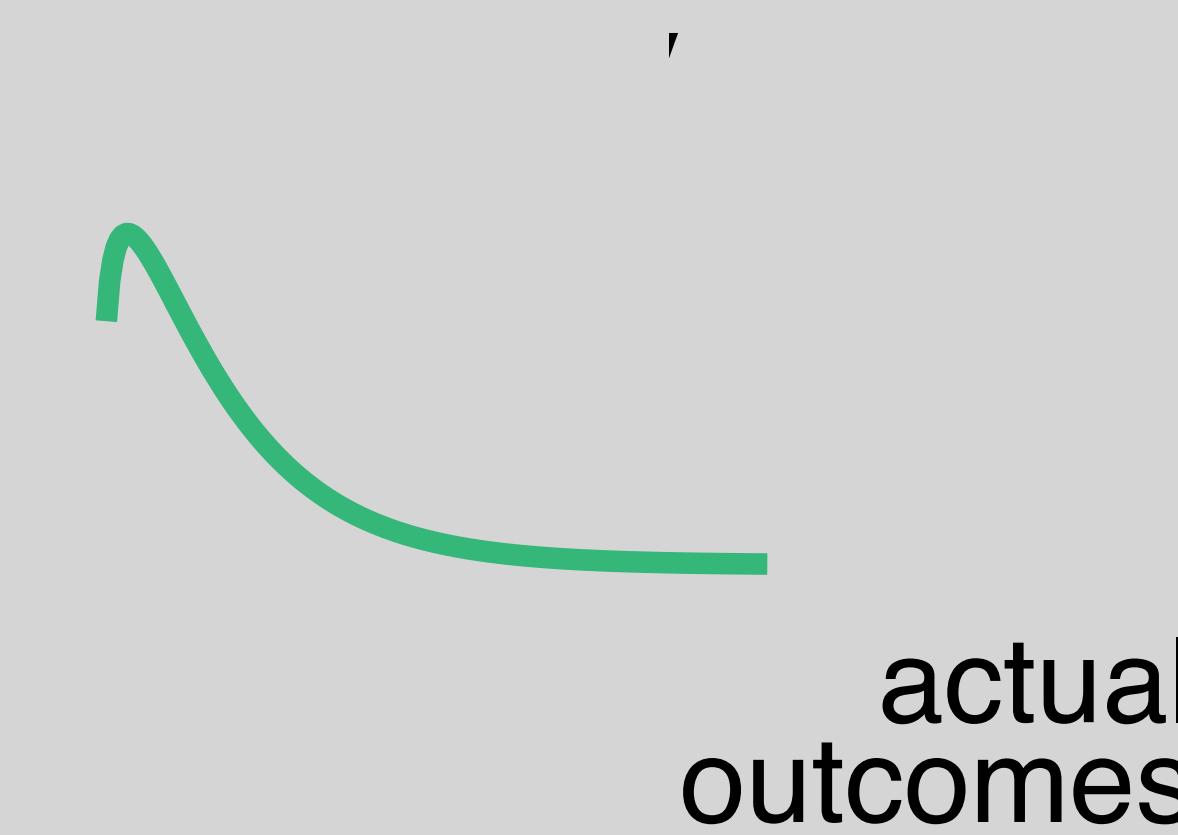


{ABC}

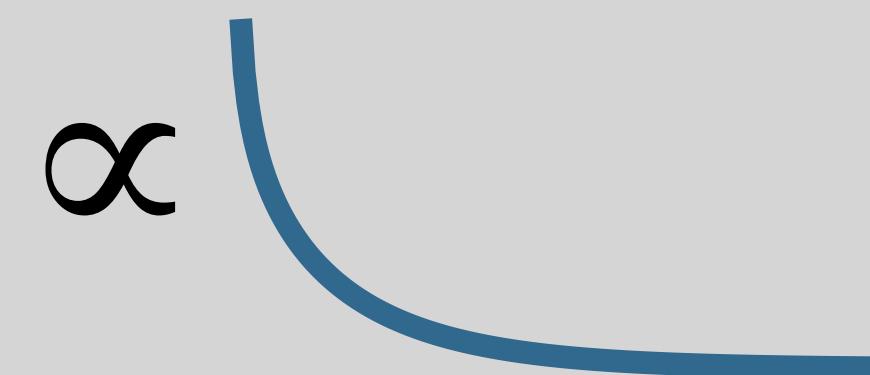


{ABC}

age in relation \propto

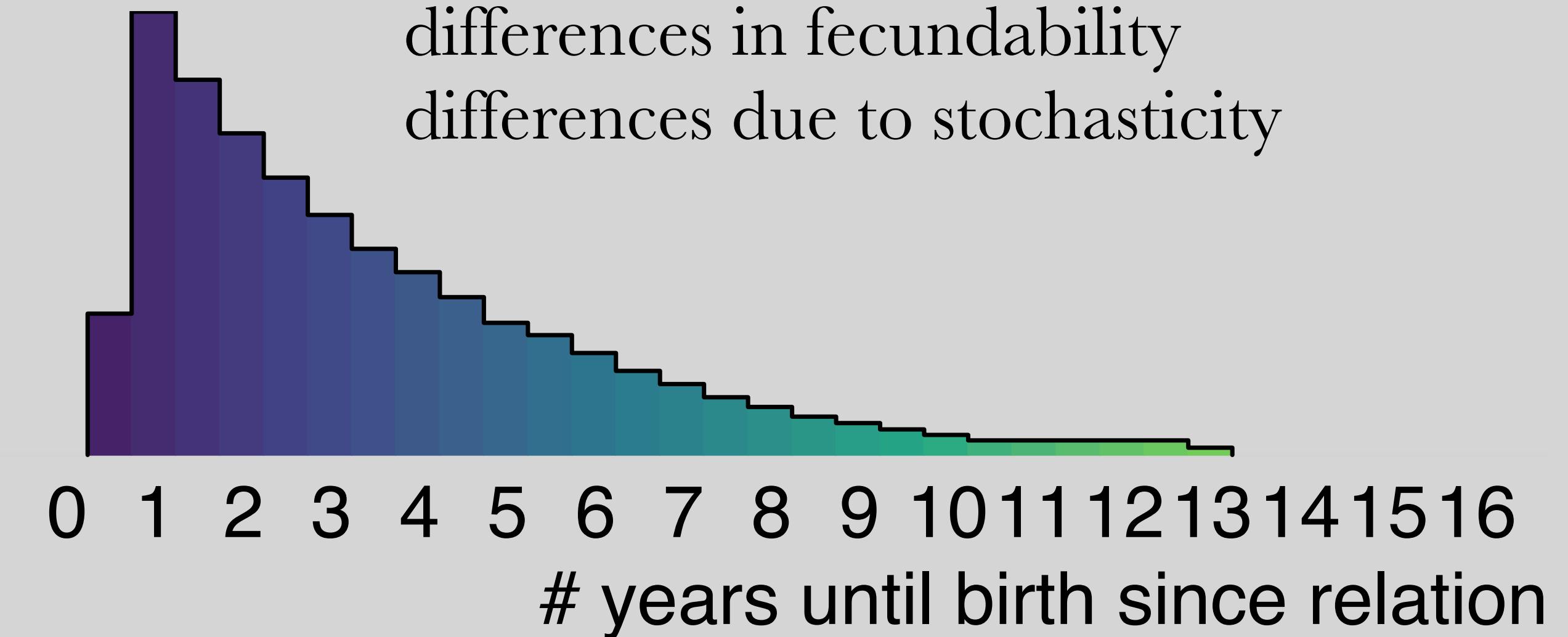


age in relation
fecundability
stochasticity \propto



Variation due to:

preferred waiting time child
differences in fecundability
differences due to stochasticity



{ABC}

Bayes
Posterior *Likelihood x Prior*
 $P(\theta | \text{data}) \propto P(\text{data} | \theta) \times P(\theta)$

Approximate Bayes
data = 25

Posterior { sim(θ_1) = 15
 sim(θ_2) = 25
 sim(θ_3) = 30
 sim(θ_4) = 20
 sim(θ_5) = 24.9

{ABC}

age in relation \propto

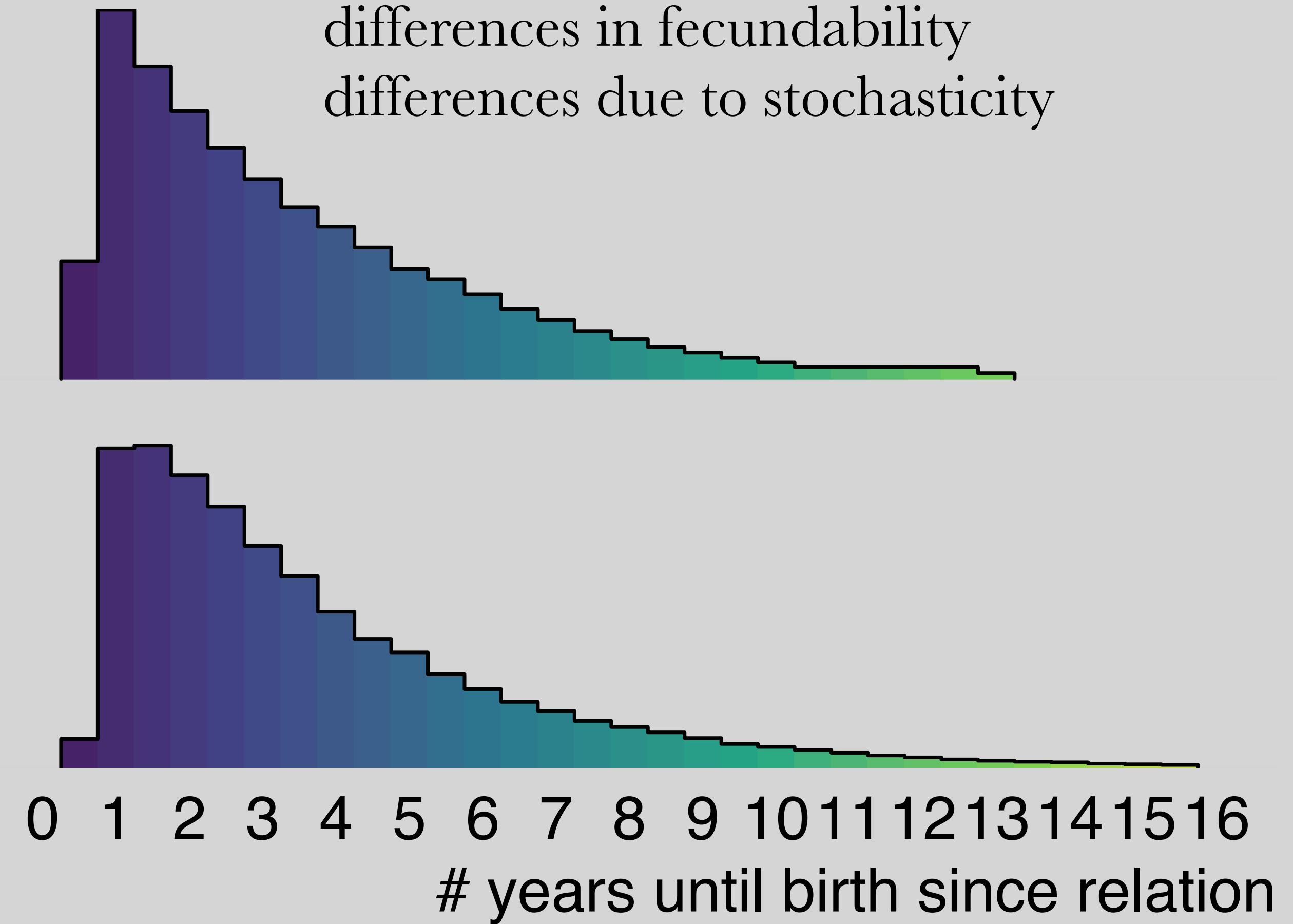
age in relation
fecundability
stochasticity \propto

actual
outcomes

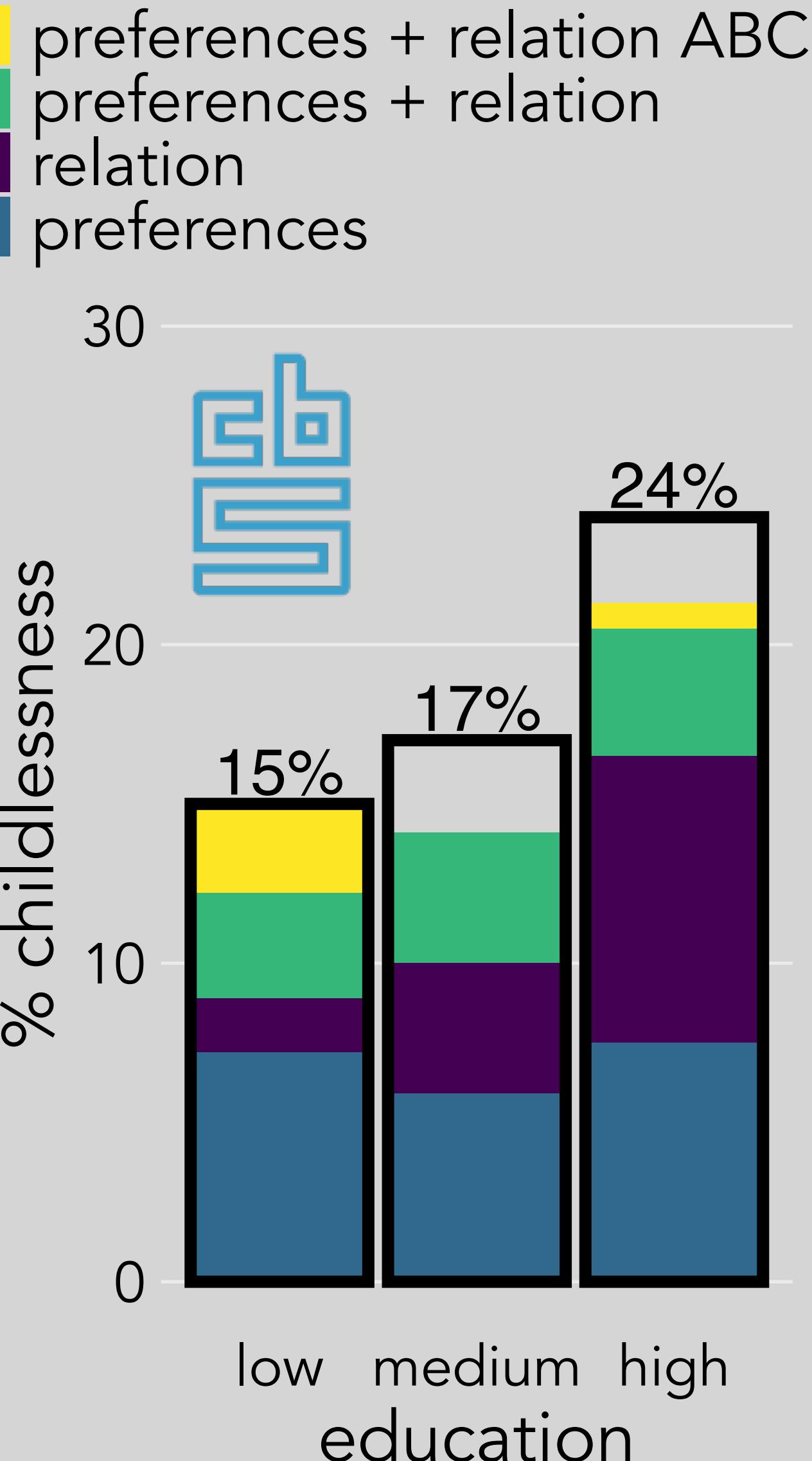
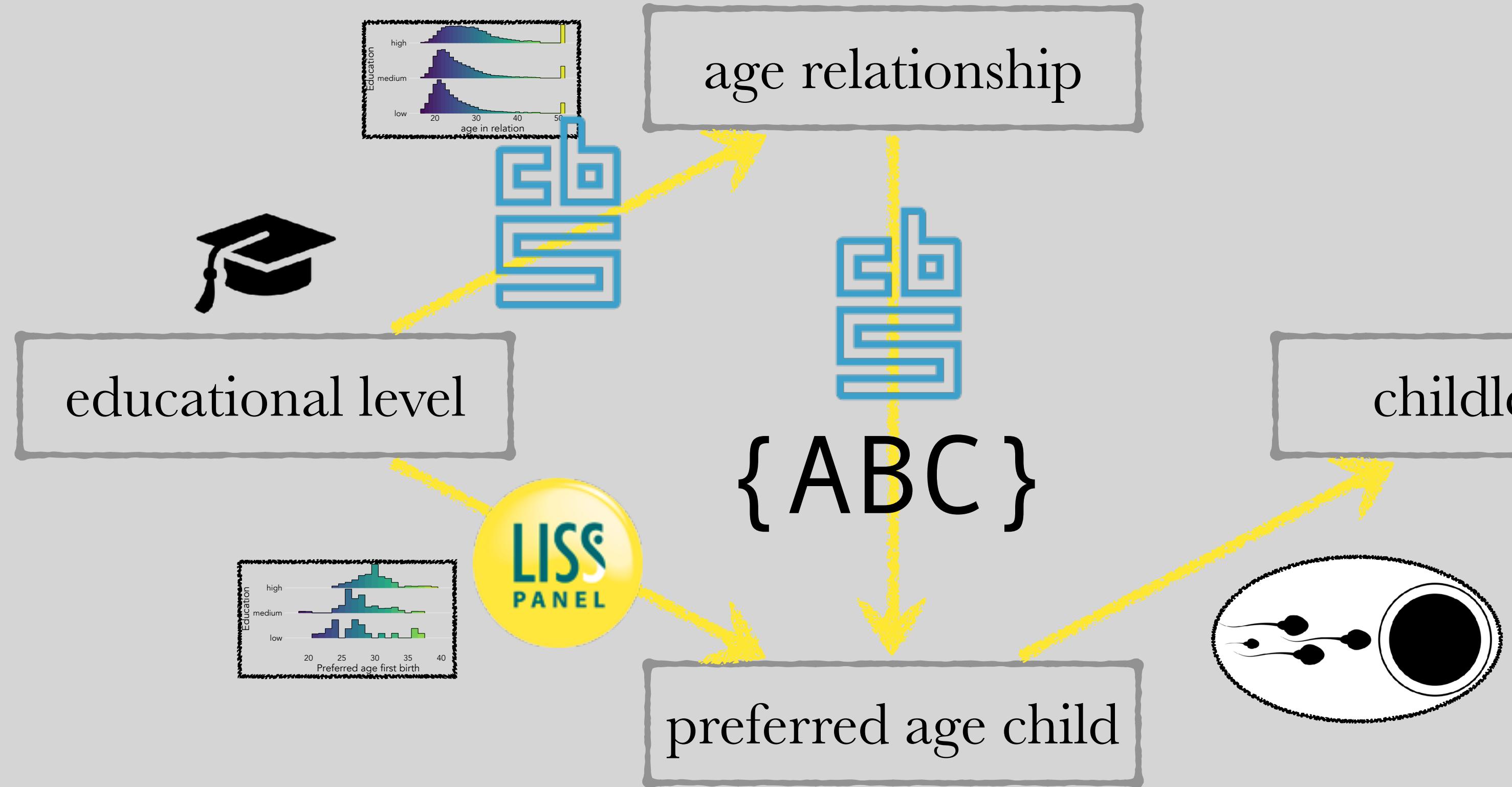
ABC
model

Variation due to:

preferred waiting time child
differences in fecundability
differences due to stochasticity



{ABC} Approximate Bayesian Computation



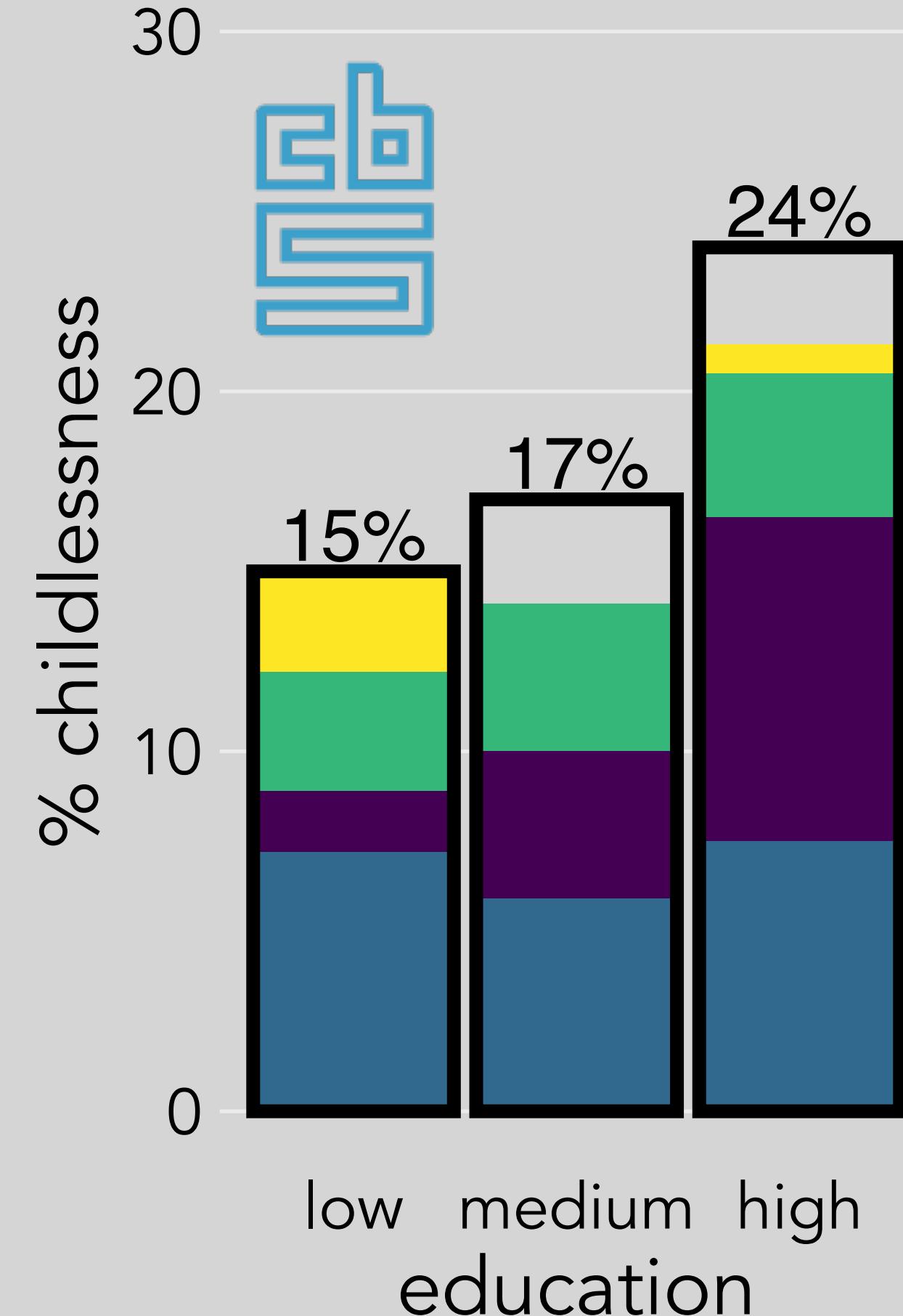
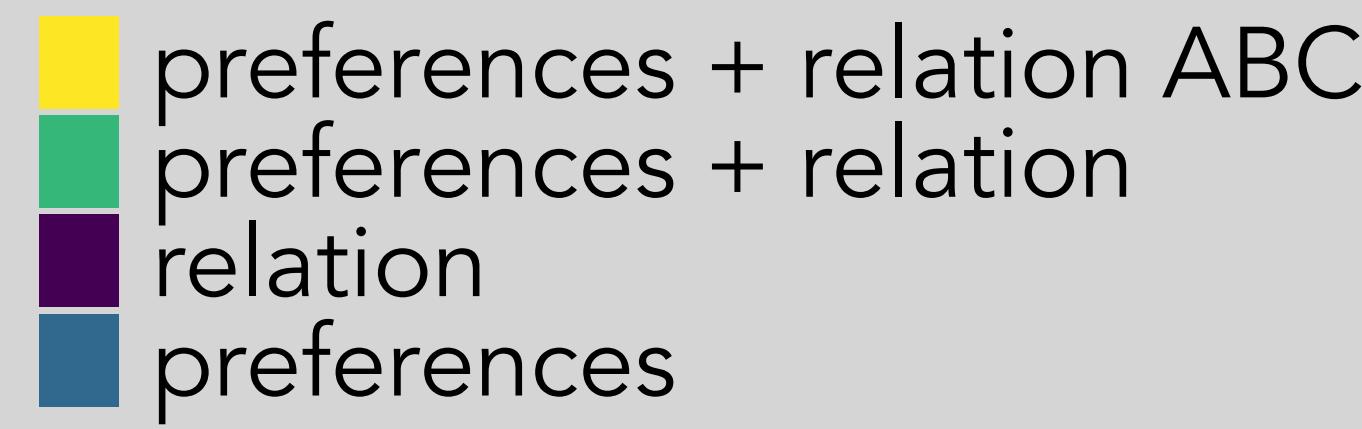
Where Did We Go Wrong?

Assumptions

1. No break-ups
2. All births are preferred
3. Preferences do not determine relationship
4. Preferences do not determine education
5. Preferences do not change
6. Education is not related to 'biology'
7. Preferences are measured well

Improvements

1. Make waiting time dependent on age and education
2. Better measures of age in relationship



If you're not
cheating, you're
not trying.

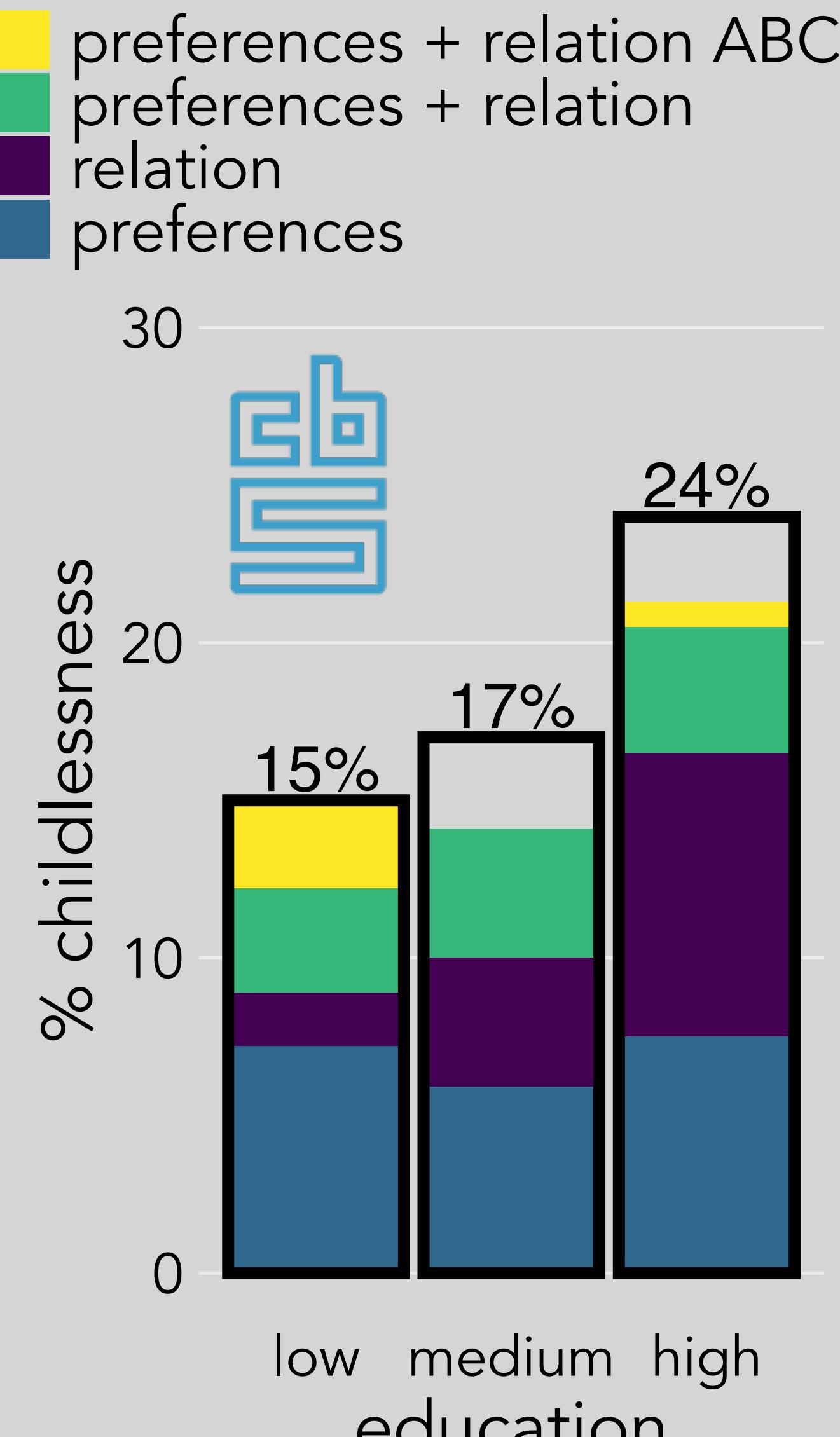
Eddie Guerrero

BrainyQuote®

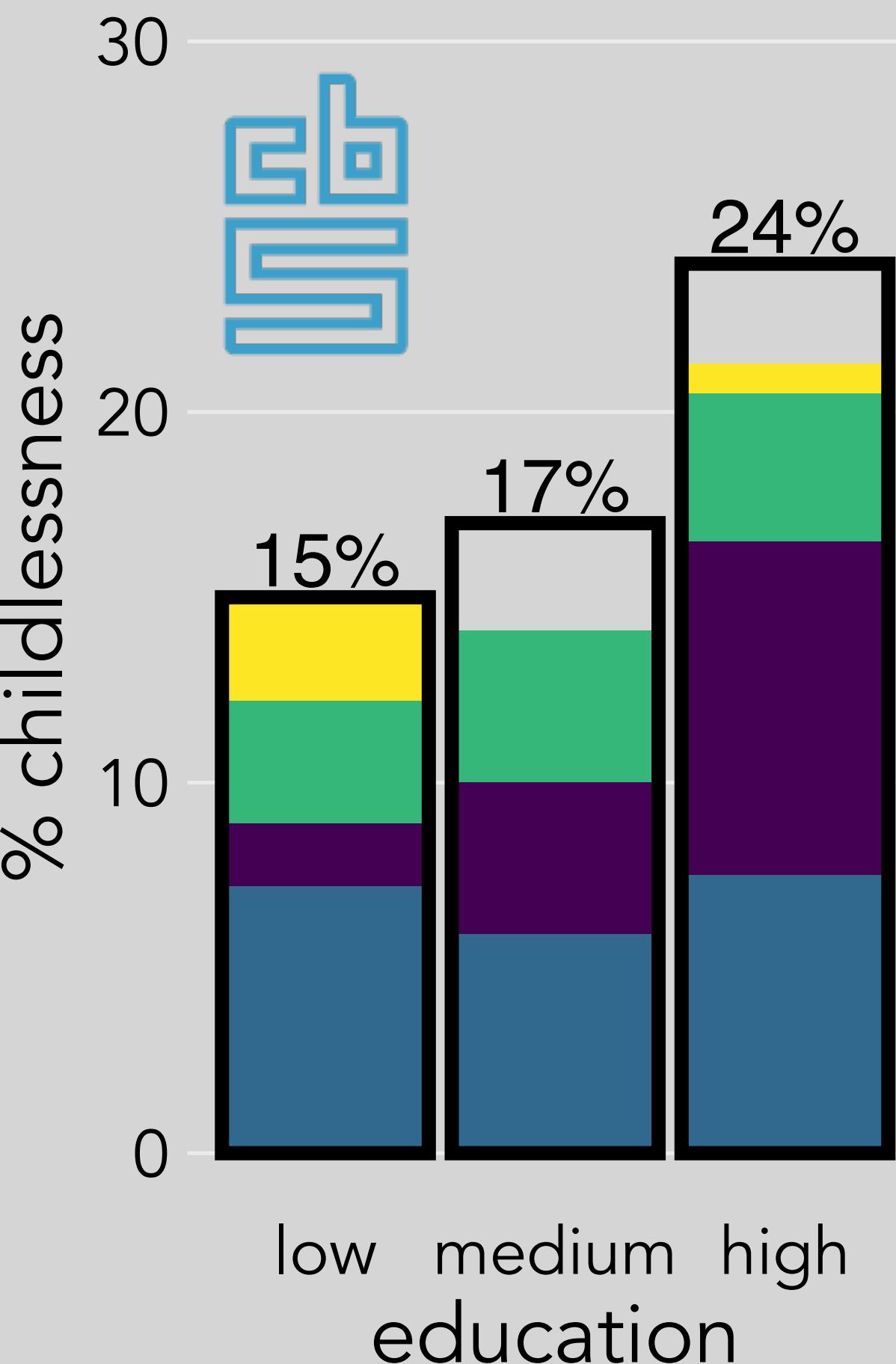
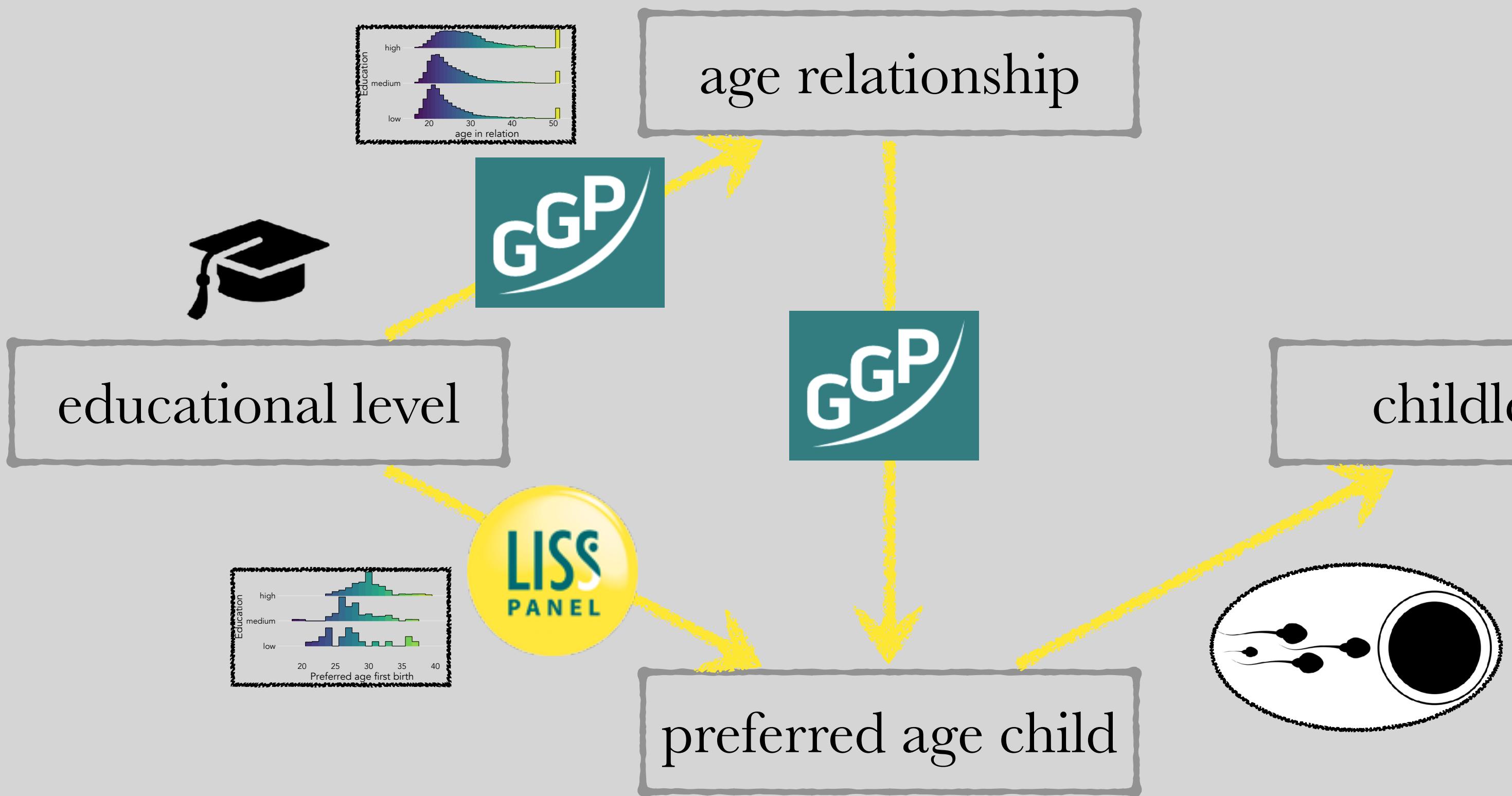
BrainyQuote®

people not in (formal) relationship **who ended up having children**,
were randomly assigned an age of relationship

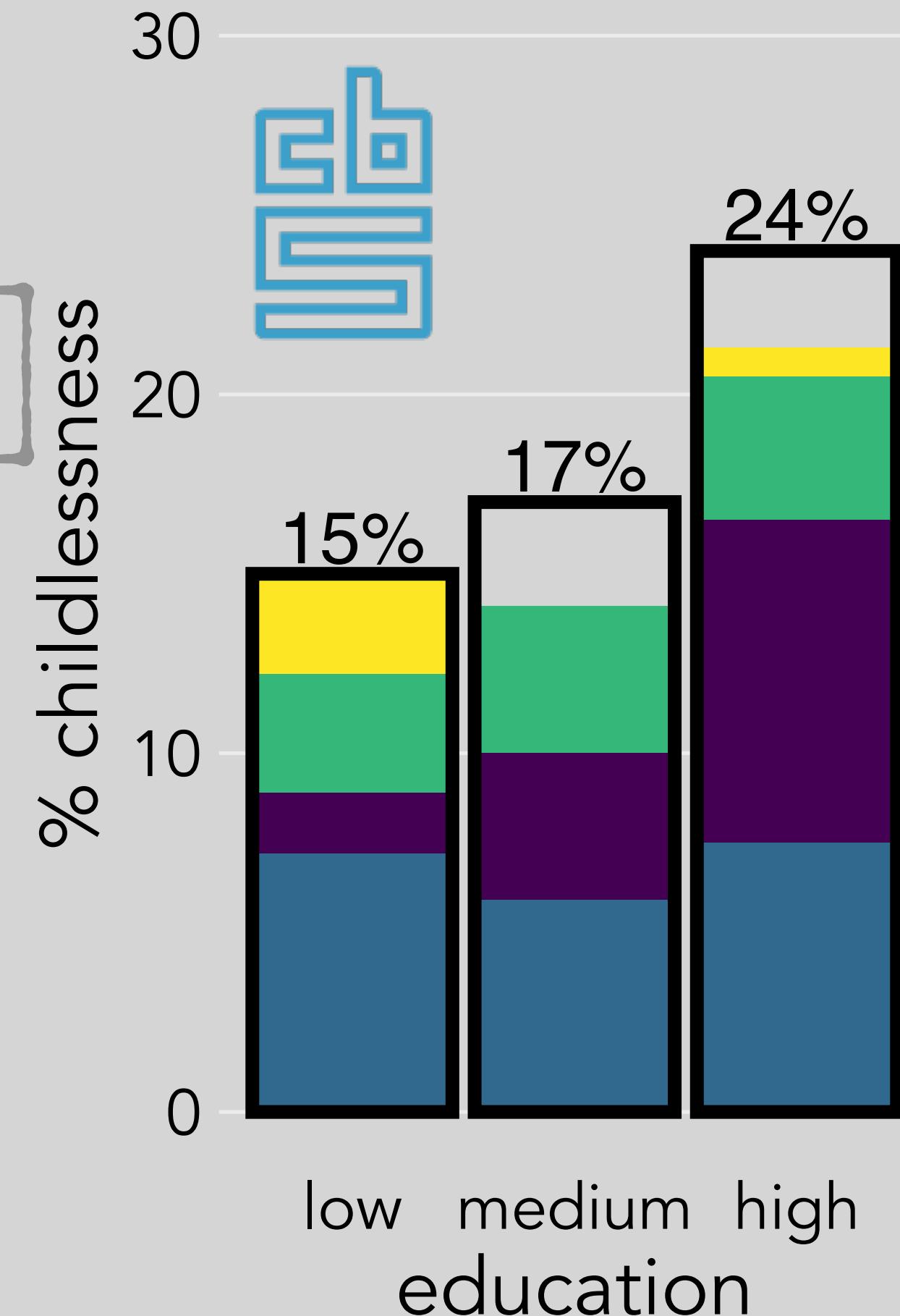
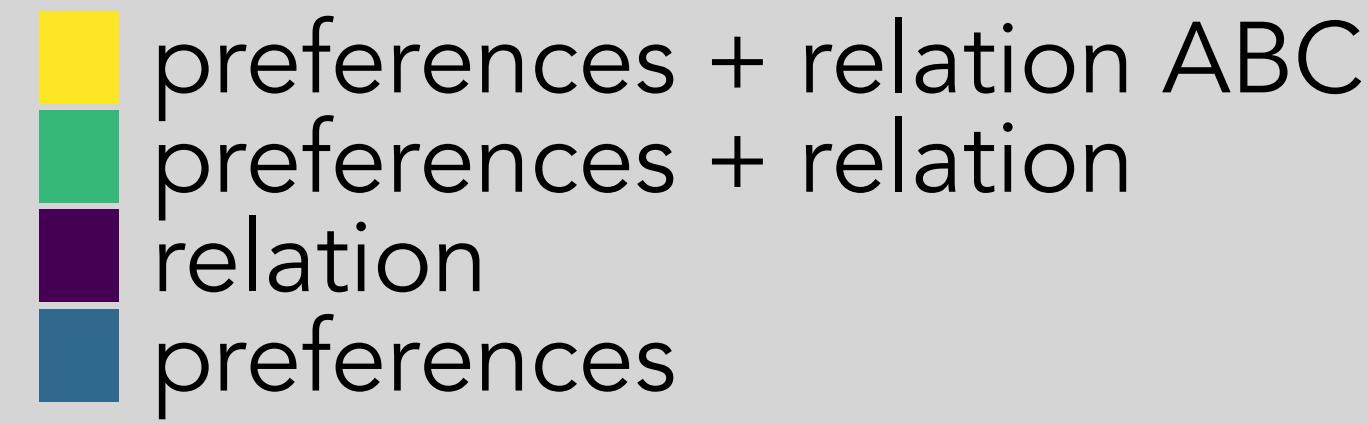
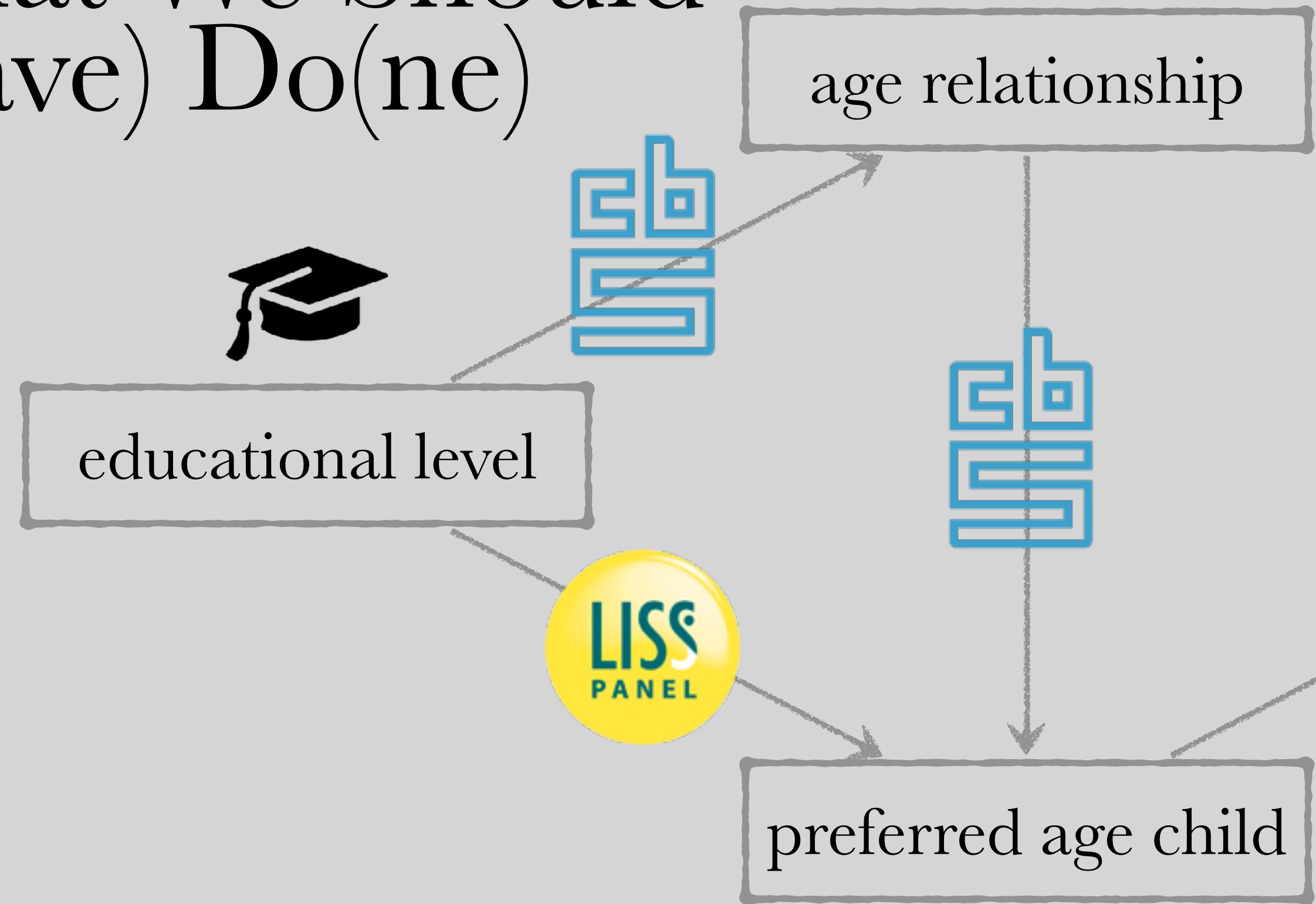
excluded the “**unknown**” education group



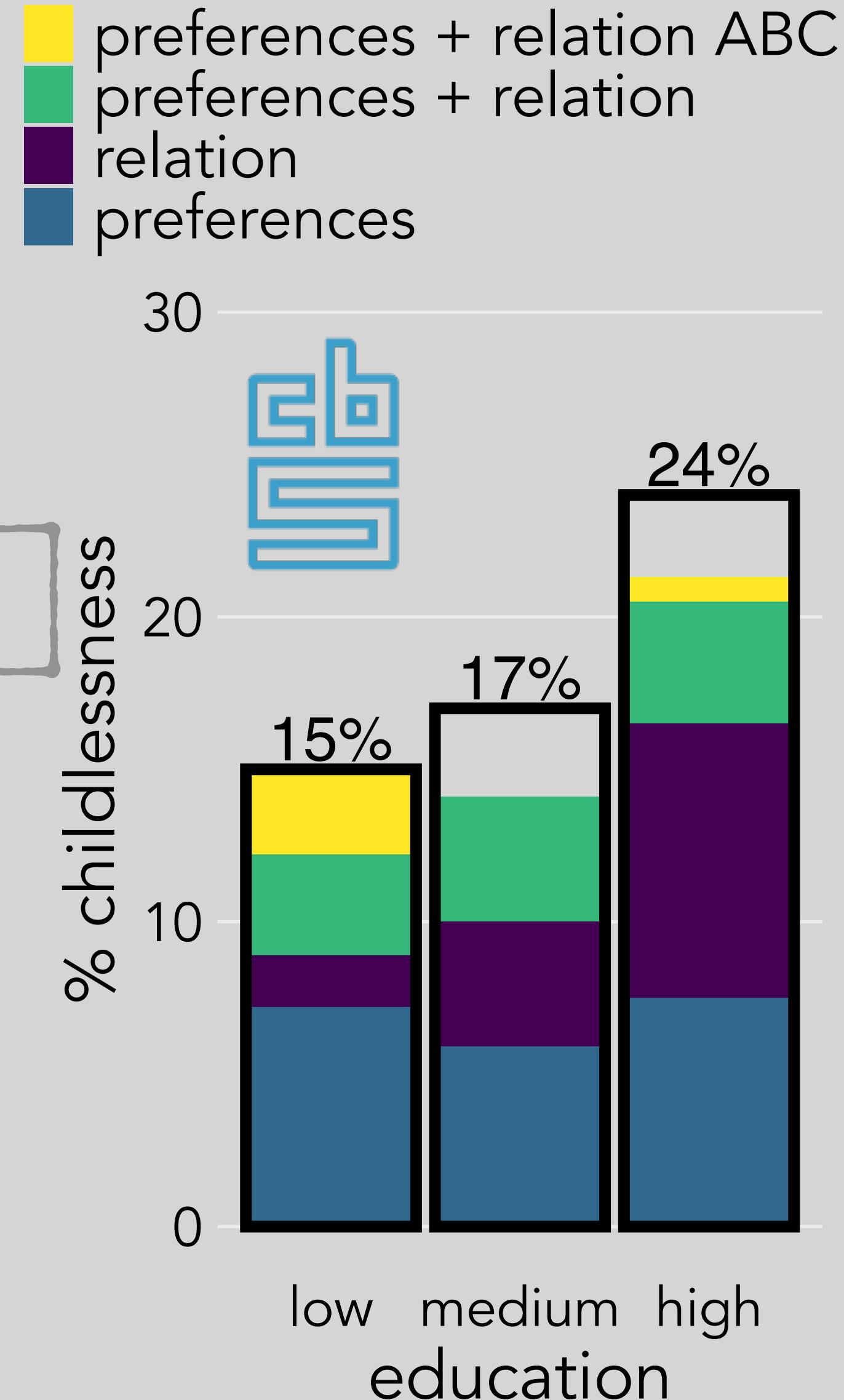
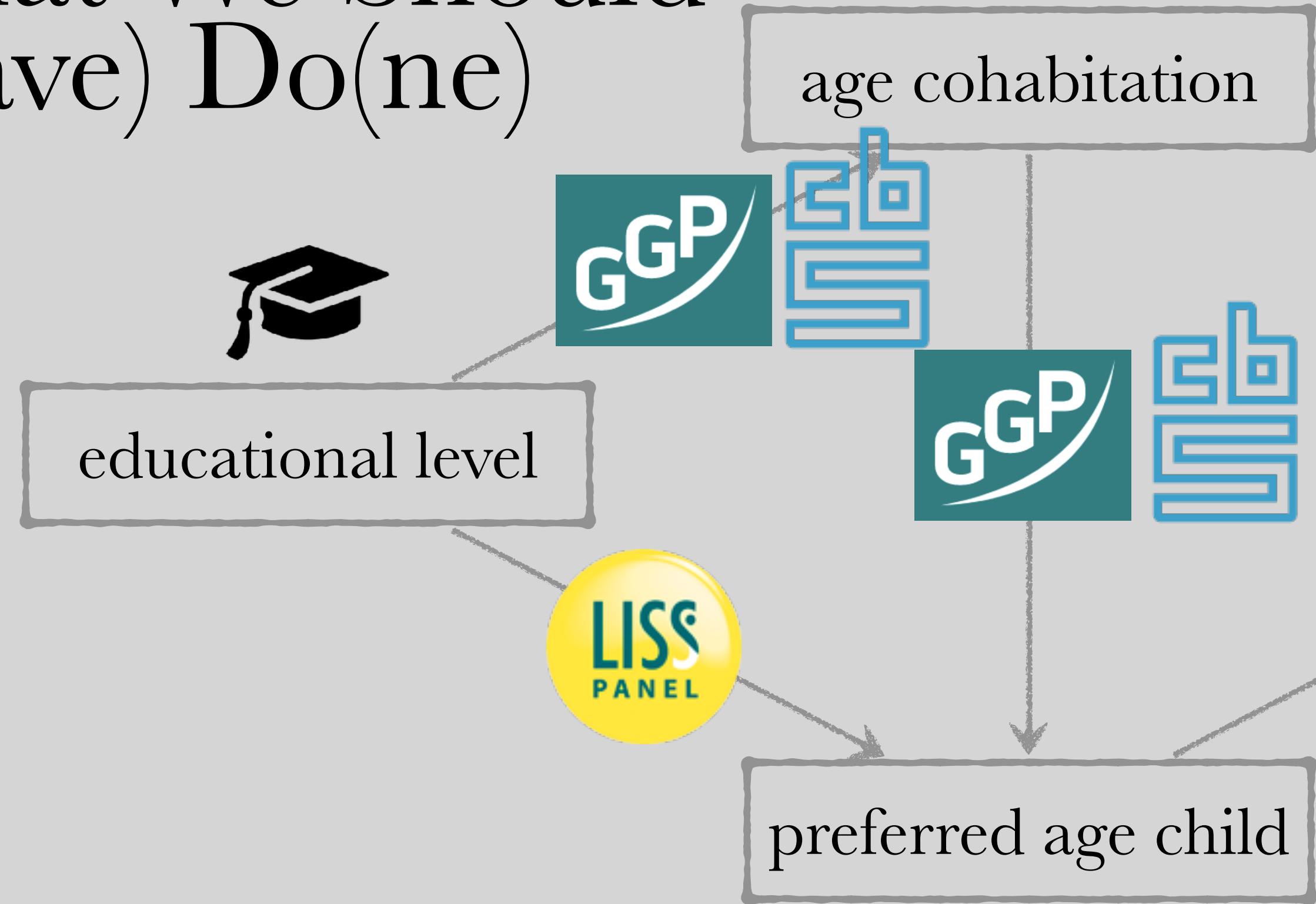
 preferences + relation ABC
 preferences + relation
 relation
 preferences



What We Should (Have) Do(ne)



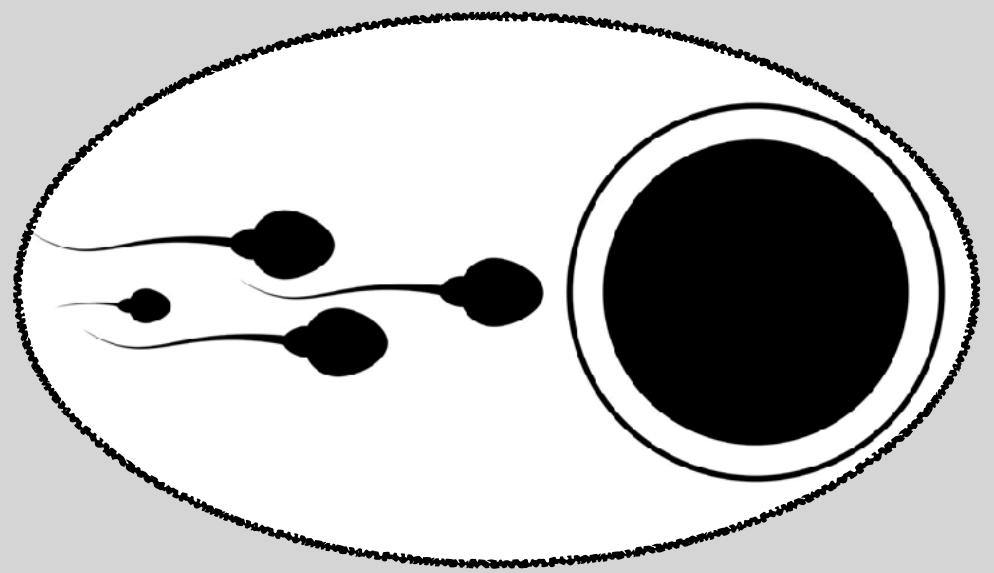
What We Should (Have) Do(ne)



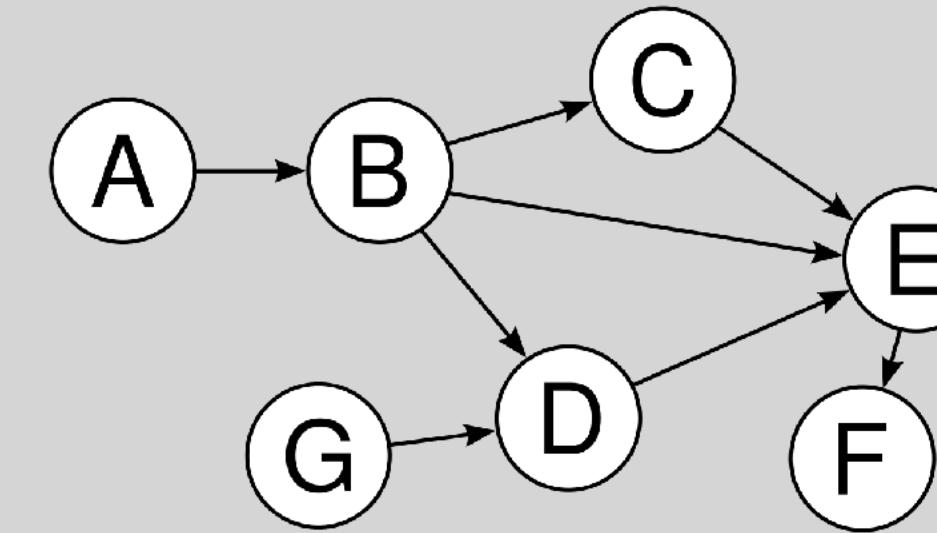
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microsimulation
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sociological research

microsimulation can:



include
biological
information



test (causal)
mechanisms

{ ABC }

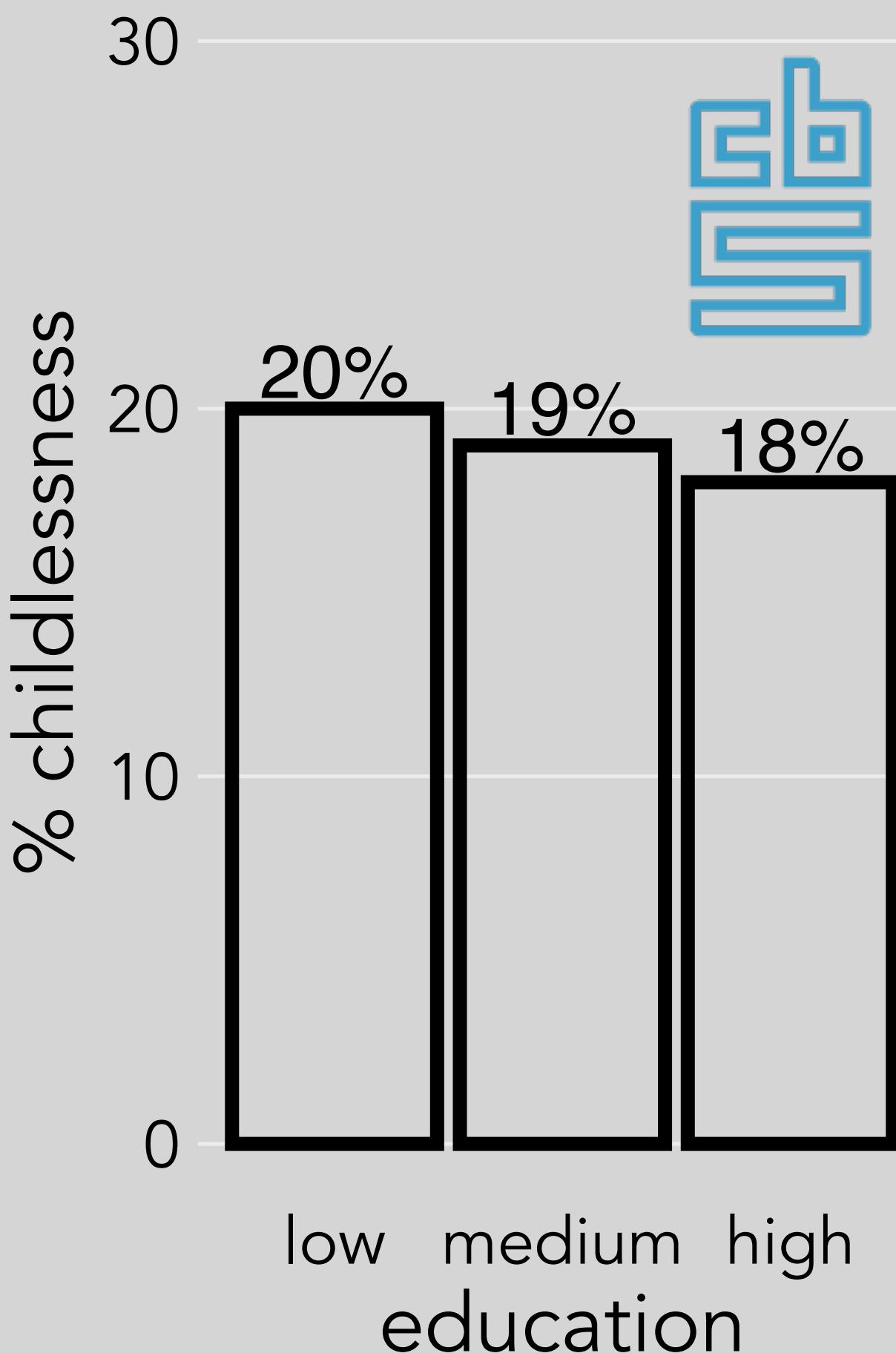
estimate unknown
parameters



Education, Gender, and Cohort Fertility in the Nordic Countries

Marika Jalovaara¹  · Gerda Neyer² · Gunnar Andersson² · Johan Dahlberg² ·
Lars Dommermuth³ · Peter Fallesen^{2,4} · Trude Lappégaard⁵

cohort '80-'84



“

In Denmark, Norway and Sweden, childlessness is now highest among the least educated women



Variation due to Stochasticity ($sd = 13$ months)

Unpredictable Variation!

%

20

15

10

5

0

0

20

40

60

80

Months until conception for 30 year old women

