

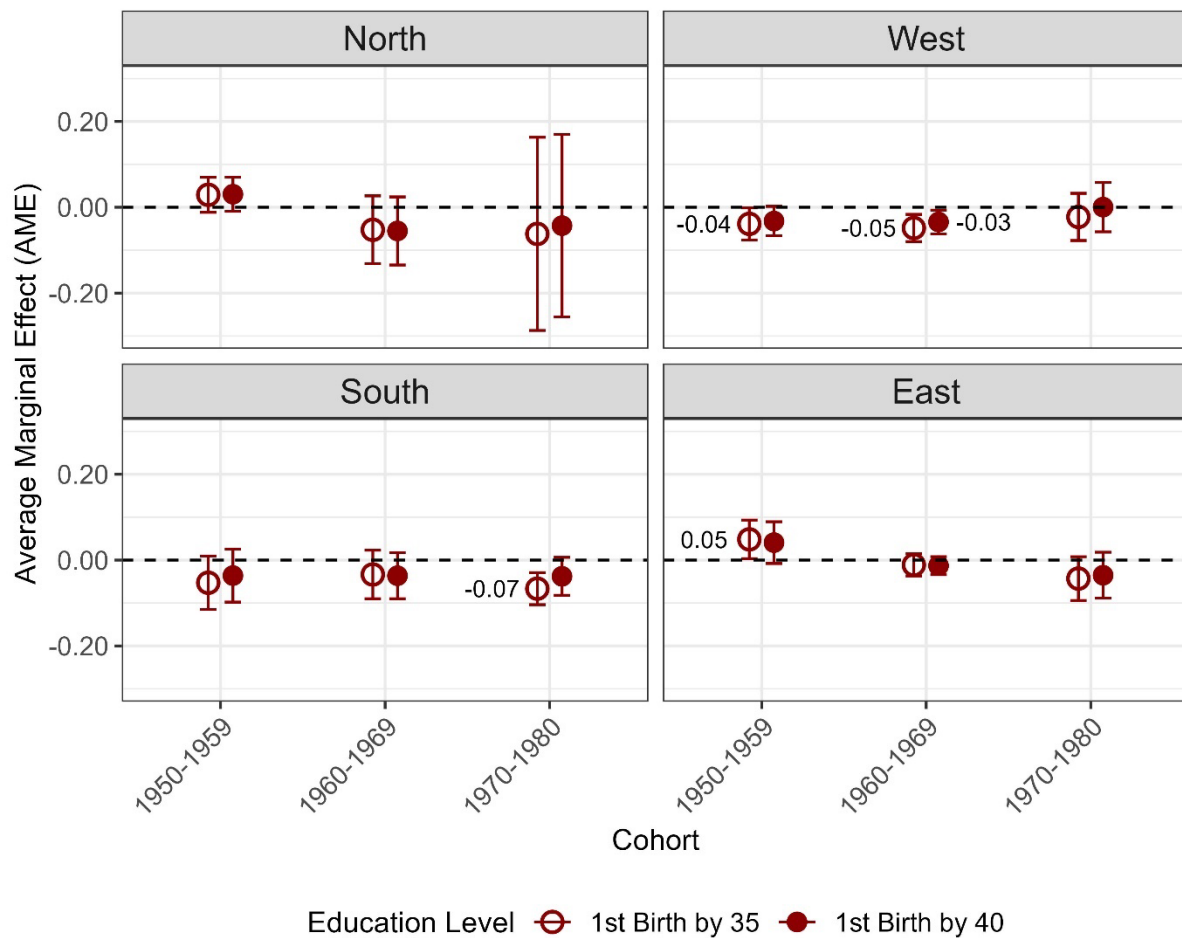
Supplementary material

Supplement to: Sturm, N., Trimarchi, A., Van Bavel, J. (2026). Is precarious union formation making it more difficult for women with low educational attainment to enter parenthood? *Vienna Yearbook of Population Research*, 24. <https://doi.org/10.1553/p-kddn-zj78>

Table S.1 Participation of countries in rounds 3 and 9

COUNTRY	3	9
AT		•
BE	•	•
BG	•	•
CH	•	•
CY	•	•
CZ	•	•
DE	•	•
DK	•	•
EE	•	•
ES	•	•
FI	•	•
FR	•	•
GB	•	•
HR		•
HU	•	•
IE	•	•
IS		•
IT		•
LT		•
LV		•
NL	•	•
NO	•	•
PL	•	•
PT	•	•
UA	•	
SE	•	•
SI	•	•
SK	•	•

Figure S.1 Comparison of average marginal effects of medium and lower education on the likelihood of having a first birth by age 35 and by age 40



Note: 95% confidence intervals. Average marginal effects based on results of logistic regression for the 1950-1980 cohort. Clustered standard errors by country. *Source:* ESS rounds 3 and 9 (own calculation).

Section S1. Instrumental variable approach (ivprobit model)

In order to apply an instrumental variable approach, we need to find a valid instrumental variable that affects the likelihood of cohabiting (our explanatory variable) directly, and that affects the likelihood of experiencing a first birth by age 35 (our dependent variable) only indirectly through the effect on cohabitation. Following the theory of assortative mating, we argue that the proportion of similarly educated men could influence the likelihood of finding a partner, while it does not necessarily directly influence the likelihood of becoming a parent.

Following De Hauw, Grow and Van Bavel (2017), we calculate the proportion of similarly educated men aged 25 to 35 at the time the respondent is aged 30, when educational attainment is more likely to be complete. Our variable is based on data from the Wittgenstein Centre Human Capital Data Explorer, which (post)estimates educational data up to 1950¹.

We use the `wcde` package in R. We download the population size (`epop`) by age, sex and education for the years 1985 to 2015, which correspond to the years when respondents from the 1955-1985 cohorts were 30 years old. We add the number of men in the 25-29 and 30-35 age groups. We recode the education variable to fit the low (ISCED 0-2), medium (ISCED 3-4) and high (ISCED 5 and above) categories. We calculate the proportions of low, medium and high educated respondents by sex and for the given year. As the years are given in five-year steps, we interpolate the proportions between the years (i.e., between 1985 and 1990, 1990 and 1995, etc, until 2015). Next, we merge the data from WCDE with the ESS data so that every respondent is matched with the proportion of similarly educated men.

The new data set includes the two outcome variables *cohabiting by age 34* and *first birth by age 35*; the main independent variables *education* (low/medium/high), *cohort* (measured continuously from 1955 to 1985) and *proportions* (proportion of the men with similar education as a continuous measure); and the control variables *parental educational background*, *religiosity*, *migration background* and *country*.

We run the instrumental variable model with the `ivprobit` command in STATA. When running the model, we see that cohabitation is more strongly related to the outcome of a first birth than in the regular probit model. The coefficients for educational level are nevertheless similar to those in the regular probit model. Furthermore, we cannot reject the Wald test of no endogeneity as $\text{Prob} > \chi^2 = 0.0541$. The results of the IV probit give only marginal evidence of endogeneity, which could be due to the instrument used. It is difficult to argue that the share of male partners with the same level of education affects cohabitation directly, while affecting (through partnership formation) the transition to a first birth only indirectly. For instance, educational homogamy may directly affect the transition to a first birth, given that similarly educated partners may share values, norms and preferences regarding fertility (Trimarchi and Van Bavel 2018; Nitsche 2024).

¹ Wittgenstein Centre for Demography and Global Human Capital (WIC) Wittgenstein Centre Data Explorer. Version 3.0 (Beta), 2023): <https://dataexplorer.wittgensteincentre.org/wcde-v3/>

IVprobit

. *** ivprobit

. ivprobit birth \$indep (cohab = proportions), vce(cluster centry) nolog nolstretch

Probit model with endogenous regressors Number of obs = 17,310

Wald chi2(22) = 20738.60

Log pseudolikelihood = -10450.562

Prob > chi2 = 0.0000

(Std. err. adjusted for 28 clusters in centry)

	Robust					
	Coefficient	std. err.	z	P> z	[95% conf. interval]	
-----+-----						
cohab	3.544	0.415	8.54	0.000	2.730	4.357
educ_ineduc						
Medium	-0.143	0.056	-2.55	0.011	-0.252	-0.033
High	-0.281	0.138	-2.03	0.042	-0.552	-0.010
chrtc	-0.004	0.002	-2.01	0.045	-0.008	-0.000
religion						
Not relig..	-0.144	0.058	-2.50	0.012	-0.257	-0.031
immigrantEU						
Born outs..	0.016	0.052	0.31	0.756	-0.085	0.117
educp						
Only Fath..	-0.069	0.036	-1.91	0.056	-0.141	0.002
Only Moth..	-0.074	0.033	-2.22	0.026	-0.139	-0.009
Both medi..	-0.093	0.058	-1.62	0.106	-0.206	0.020
Both unkn..	0.051	0.071	0.71	0.476	-0.089	0.191
cntry						
BE	0.203	0.065	3.15	0.002	0.077	0.330
BG	0.497	0.159	3.13	0.002	0.186	0.808
CH	-0.172	0.095	-1.80	0.071	-0.359	0.015
CY	0.382	0.072	5.30	0.000	0.241	0.524
CZ	0.232	0.136	1.71	0.087	-0.034	0.497
DE	-0.074	0.022	-3.32	0.001	-0.117	-0.030
DK	-0.102	0.085	-1.19	0.232	-0.268	0.065
EE	0.302	0.213	1.42	0.157	-0.116	0.720
ES	0.049	0.075	0.65	0.516	-0.099	0.196
FI	-0.055	0.049	-1.14	0.256	-0.150	0.040
FR	-0.023	0.040	-0.58	0.565	-0.101	0.055
GB	-0.097	0.026	-3.75	0.000	-0.148	-0.046
HR	0.365	0.029	12.51	0.000	0.308	0.422
HU	0.164	0.048	3.44	0.001	0.071	0.258

IE	0.270	0.063	4.29	0.000	0.147	0.394
IS	0.472	0.199	2.37	0.018	0.082	0.862
IT	0.122	0.181	0.67	0.500	-0.233	0.478
LT	0.231	0.119	1.95	0.051	-0.001	0.463
LV	0.275	0.167	1.65	0.099	-0.052	0.602
NL	0.048	0.048	1.00	0.317	-0.046	0.142
NO	-0.049	0.078	-0.62	0.535	-0.202	0.105
PL	0.249	0.077	3.23	0.001	0.098	0.400
PT	0.003	0.021	0.13	0.897	-0.039	0.045
SE	0.037	0.093	0.40	0.690	-0.146	0.220
SI	0.328	0.192	1.71	0.088	-0.049	0.705
SK	0.515	0.071	7.22	0.000	0.375	0.654
UA	0.912	0.261	3.49	0.000	0.400	1.424
_cons	-2.338	0.708	-3.30	0.001	-3.726	-0.949

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corr(e.cohab,						
e.birth)	-0.753	0.220			-0.962	0.017
sd(e.cohab)	0.296	0.012			0.275	0.320

Wald test of exogeneity (corr = 0): chi2(1) = 3.71 Prob > chi2 = 0.0541

Endogenous: cohab

Exogenous: 2.educ_ineduc 3.educ_ineduc chrte 2.religion 2.immigrantEU
2.educp 3.educp 4.educp 5.educp 2.centry 3.centry 4.centry 5.centry
6.centry 7.centry 8.centry 9.centry 10.centry 11.centry 12.centry
13.centry 14.centry 15.centry 16.centry 17.centry 18.centry 19.centry
20.centry 21.centry 22.centry 23.centry 24.centry 25.centry 26.centry
27.centry 28.centry proportions

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