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**Parental leave and fertility:
educational and ethnic differences in
the tempo and quantum of second and third births**

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Previous studies: educational (or income) differences

- ▶ In **Germany**, transition to earnings-related PL had a **positive** fertility effect for **tertiary-educated women**, for **low-educated** the effect was **negative** (Raute, 2019; Cygan-Rehm, 2016)
- ▶ In **Germany**, another reform made PL benefits deductible from welfare benefits. Among welfare recipients, the **negative effect** was **more pronounced** among mothers with **low education** (Sandner & Wijnck, 2023)
- ▶ In **Austria**, the extension of the paid PL had a **stronger** and **more persistent positive** fertility effect among **low-wage mothers** (Lalive & Zweimüller, 2009).
- ▶ In **U.S.**, the introduction of unpaid job-protected leave **increased** the probability of next birth for **highly-educated women**, but not for other groups (Cannonier, 2014).
- ▶ In **Sweden**, native-born women at **all educational levels** accelerated the transition to second birth **in a similar way** in response to speed premium (Andersson et al., 2006)



Previous studies: ethnic differences

- ▶ Andersson et al. (2006) found the **shortening** of second- and third-birth intervals among immigrants from **other Nordic countries** and **women born in Sweden** to the extension of speed premium period. However, immigrants **from non-Nordic countries** hardly reacted to speed premium.
- ▶ Cannonier (2014) compared the reactions of **Blacks, Hispanics, and Whites** to the **1993 U.S.** maternity leave reform. The only significant result was found for **White women**, whose **probability** of first and second birth **increased** in relation to the reform.



Parental leave reform in 2004

- ▶ The reform **replaced low flat-rate** benefits with **generous earnings-related** benefits
 - ▶ **High compensation** rate and high ceiling – 100% of earnings, ceiling three average salaries
 - ▶ **Long duration** – paid duration initially 11 months, from 2008 18 months
 - ▶ **Speed premium** – if interbirth interval does not exceed 30 months
 - ▶ **Flat rate benefits** for those with no previous labour income – close to minimum wage
 - ▶ **Father's quota** – one month from 2020, 16% of benefit recipients are fathers (2021)
- ▶ A recent study found **fertility effects of the reform** (Puur et al. 2023)
 - ▶ **Tempo effect** – shortening of birth intervals between 1st and 2nd, 2nd and 3rd births
 - ▶ **Quantum effect** – increase in the odds of 2nd and 3rd births



Research question and hypotheses

▶ Research question

How do **changes in childbearing behaviour** associated with the PL reform vary among **across educational and ethnic groups**?

▶ Hypotheses

H1: Tempo — shortening of birth intervals **more pronounced among highly educated**

(larger gains from speed premium feature of the PL scheme)

H2: Quantum — increase in the progression to next birth **larger among highly educated**

(larger decrease in opportunity costs and reconciliation of family and work life balance)

H3, H4: Tempo and quantum — responses **stronger among Estonians** compared to other groups

(larger gains from speed premium, larger decrease in opportunity costs)



Data, study population, and events

▶ Data sources

Population register: defines study population, birth and marital histories

Medical birth register: characteristics of women/partners at the start of birth intervals

Macro-economic data: Statistics Estonia/Bank of Estonia/Eurostat

▶ Study population

Women born in **1960–1999**, who had their first or second child between **1993** and **2014**

▶ Events, censoring, etc.

Process time: from 1st to 2nd and from 2nd to 3rd birth (or censoring)

Censoring: at woman's death, emigration, age 45 or 03.2019 (07.2017 in case of 3rd births)

Excluded: women with multiple births and circular migrants

Size of working sample: 125,284 (2nd) and 89,936 (3rd) women



Methods

▶ Descriptive methods

Duration-specific birth rates (Št'astna et al. 2020)

Kaplan-Meier estimates of transition to second and third birth

▶ Multivariate methods

Mixture cure (split-population) model (Gray et al. 2010; Bremhorst et al. 2016)

Two submodels

- *incidence submodel* - propensity to have a second/third child (quantum)
- *duration submodel* – length of birth intervals (tempo)


Variables

- *individual-level controls*: woman's age group, birth cohort, education, activity status/ occupation, settlement type, ethnicity, partnership status at the start of birth interval, time-varying marital history, sex of previous child/ren, partner's education
- *macro-economic controls*: yearly GDP change, UE rate, consumer confidence index (CCI)




Main explanatory variable: interaction of time-varying policy reform variable with education and ethnicity variables

Models for educational groups



High (tertiary)	<ul style="list-style-type: none">• Before ref• After ref
Medium (upper secondary)	<ul style="list-style-type: none">• Before ref• After ref
Low (primary/low er secondary)	<ul style="list-style-type: none">• Before ref• After ref

Models for ethnic groups



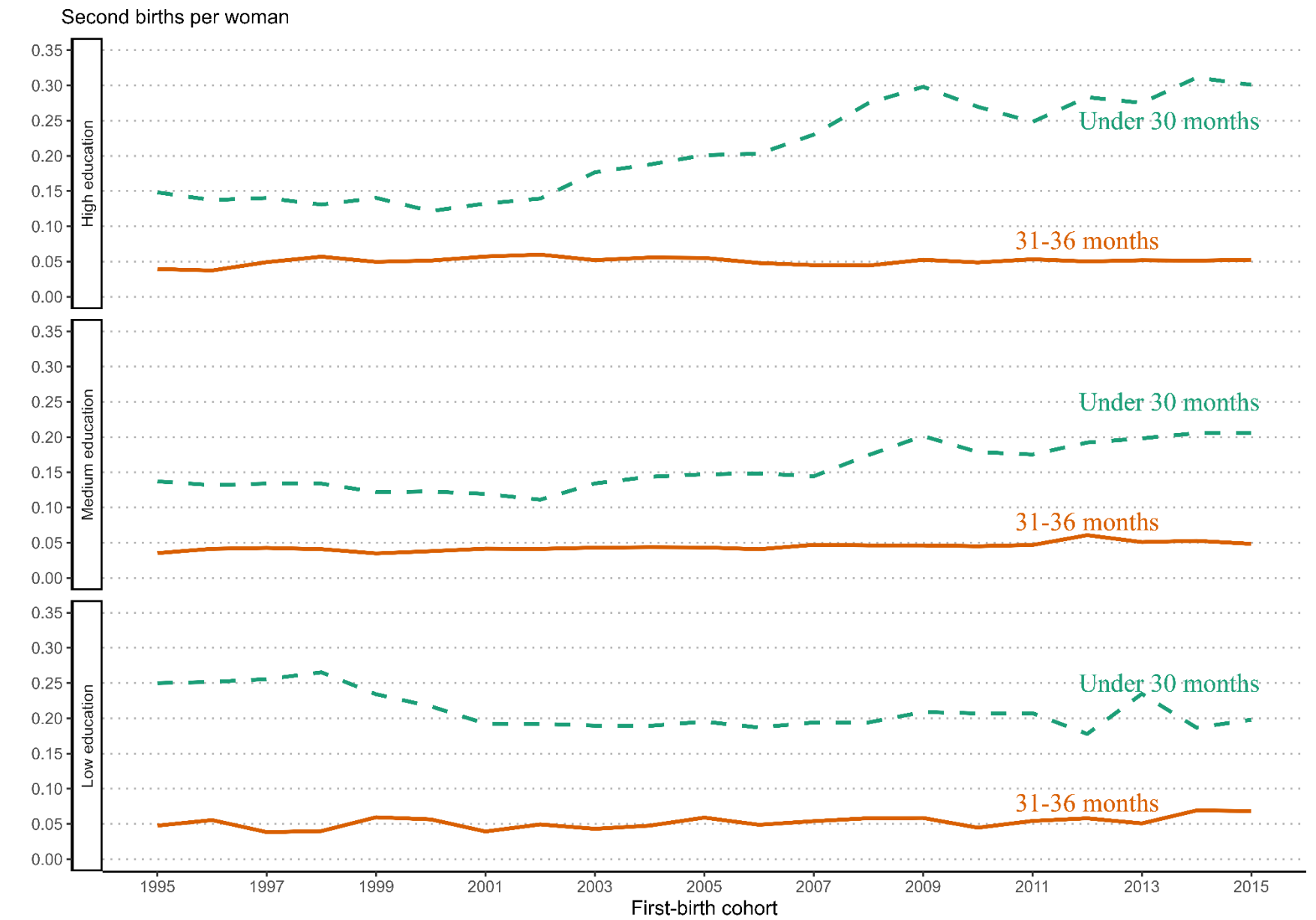
Estonians	<ul style="list-style-type: none">• Before ref• After ref
Other ethnic groups	<ul style="list-style-type: none">• Before ref• After ref



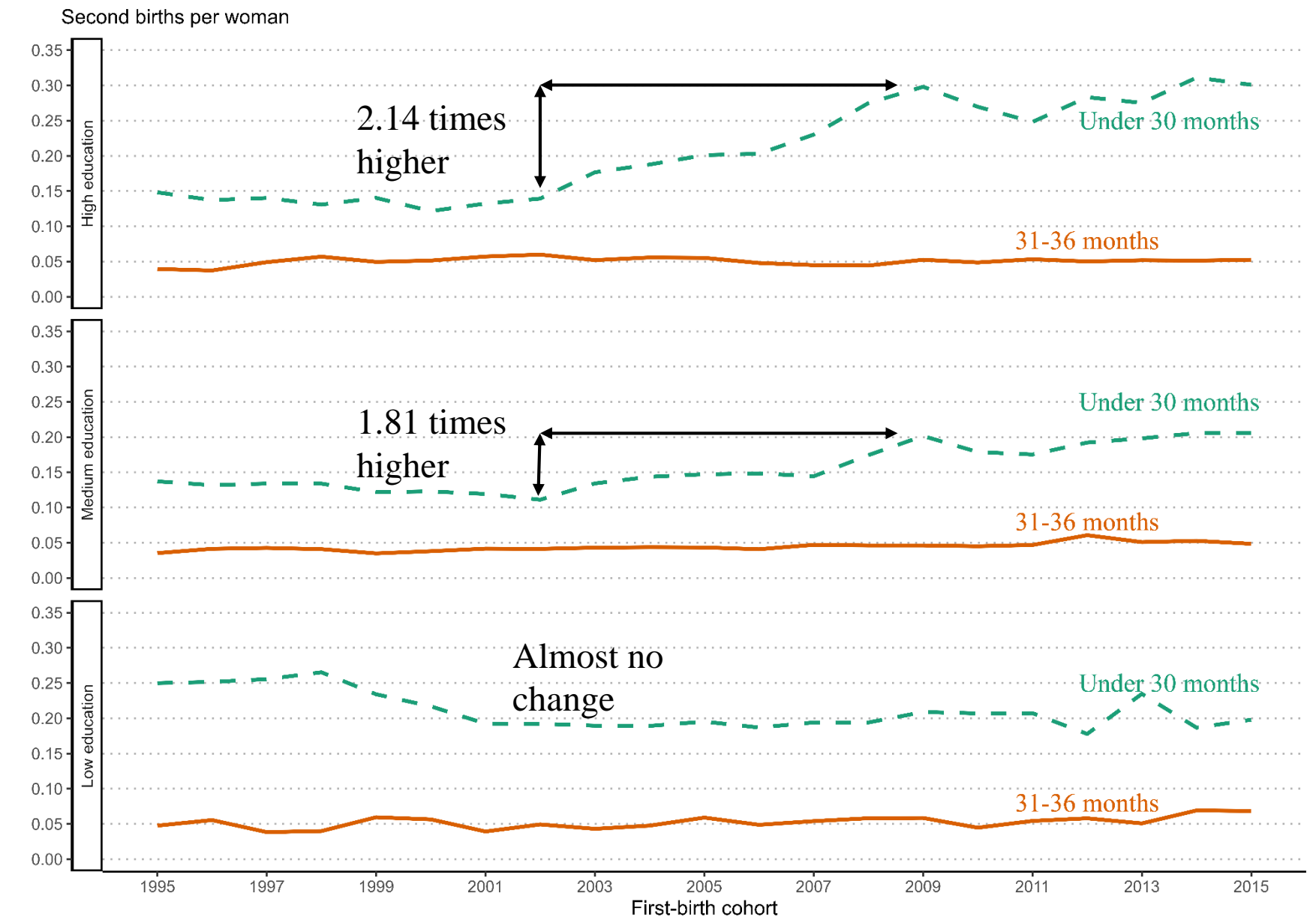
Descriptive results



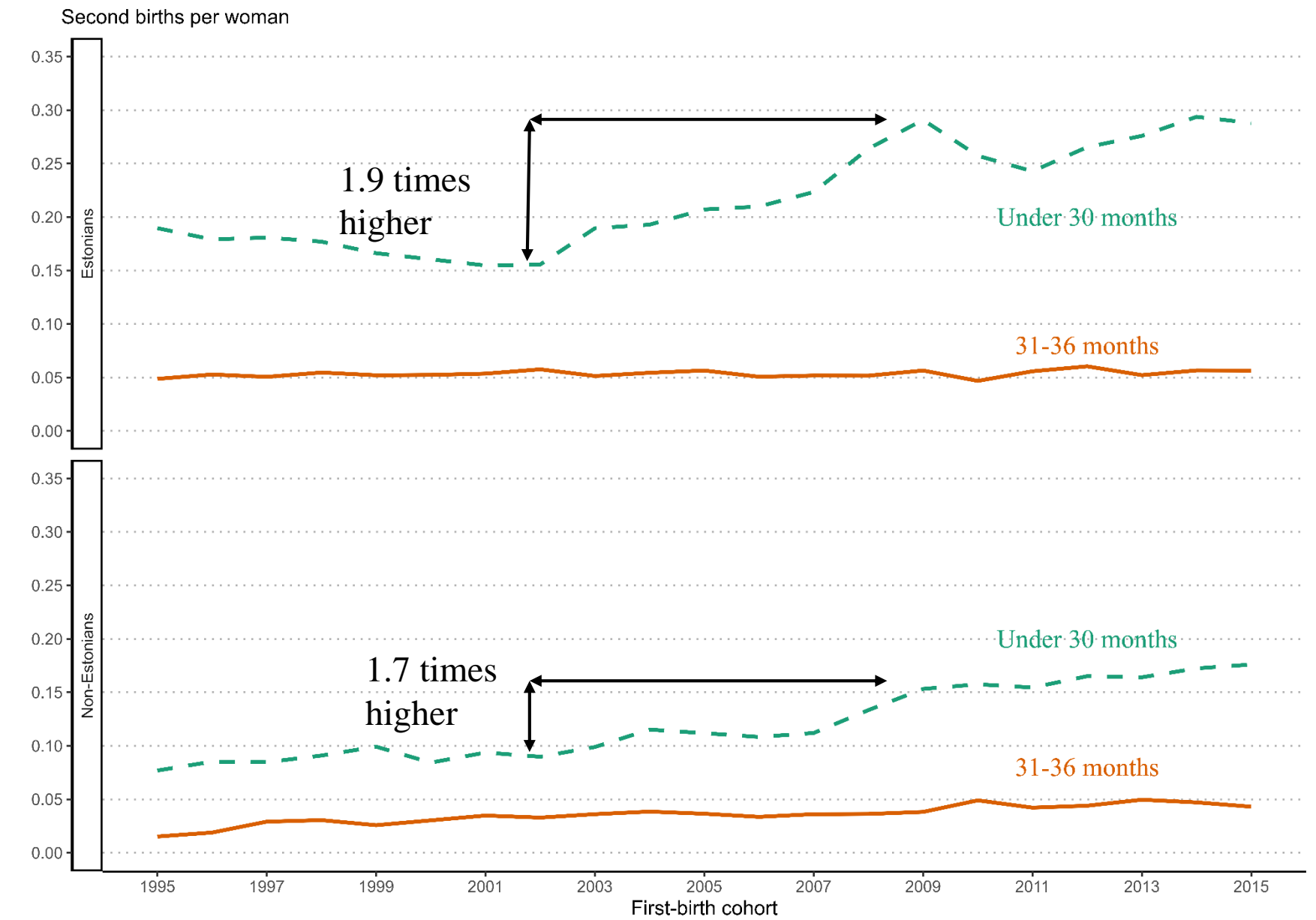
Duration-specific second-birth rates (short durations) by women's education at previous birth, female parity cohorts 1995–2015, Estonia



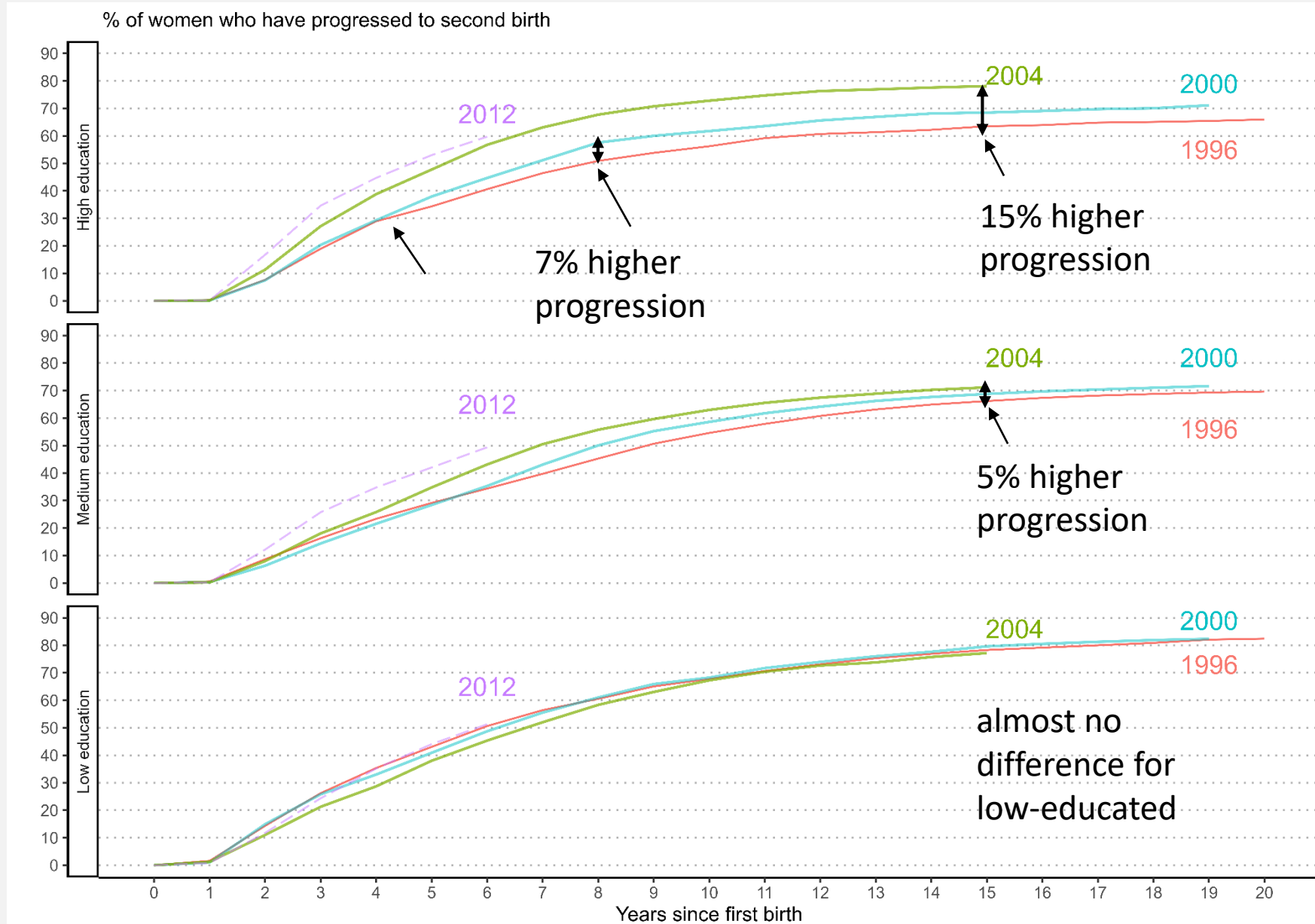
Duration-specific second-birth rates (short durations) by women's education at previous birth, female parity cohorts 1995–2015, Estonia



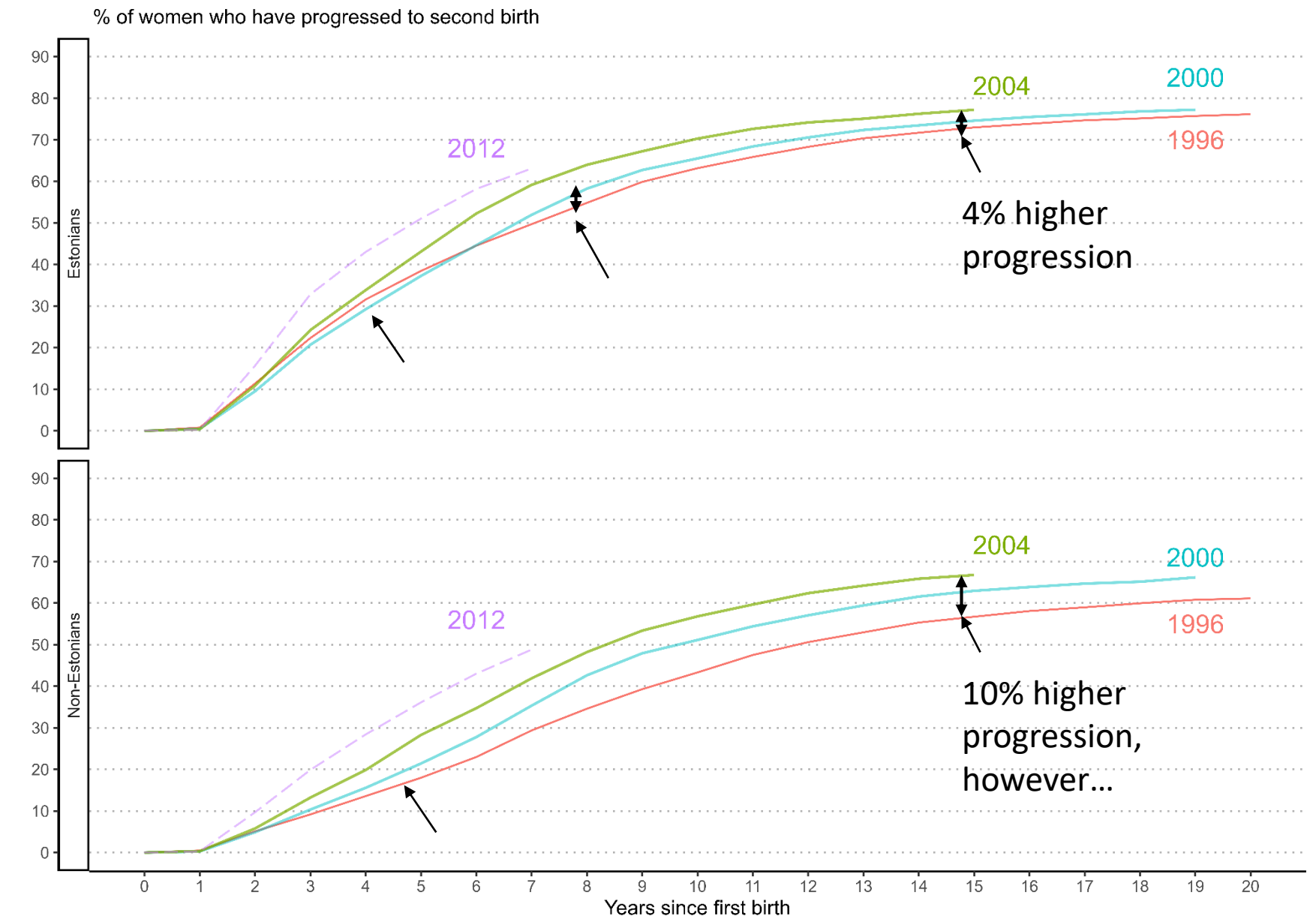
Duration-specific second-birth rates (short durations) by women's ethnicity, female parity cohorts 1995–2015, Estonia



Inverted Kaplan-Meier estimates for transition to **second birth** by women's **education** at previous birth, female parity cohorts 1996–2012, Estonia



Inverted Kaplan-Meier estimates for transition to second birth by women's ethnicity, female parity cohorts 1996–2012, Estonia



Mixture cure modelling



Exponentiated coefficients of the **policy variable interacted with women's education** for progression to **second and third birth** (mixture cure model), women born 1960–1999, Estonia

	Incidence submodel		Duration submodel	
	Before reform	After reform	Before reform	After reform
<i>Parity progression 1→2</i>				
High (ISCED5–8)	1.39 (0.000)	1.97 (0.000)	1.08 (0.001)	0.76 (0.000)
Medium (ISCED3–4)	1	1.31 (0.000)	1	0.83 (0.000)
Low (ISCED0–2)	0.77 (0.002)	1.10 (0.141)	0.65 (0.000)	0.80 (0.000)
<i>Parity progression 2→3</i>				
High (ISCED5–8)	1.27 (0.003)	1.88 (0.000)	1.20 (0.001)	0.85 (0.000)
Medium (ISCED3–4)	1	1.34 (0.000)	1	0.81 (0.000)
Low (ISCED0–2)	1.31 (0.010)	1.34 (0.000)	0.62 (0.000)	0.66 (0.000)



Exponentiated coefficients of the **policy variable interacted with women's education** for progression to **second and third birth** (mixture cure model), women born 1960–1999, Estonia

	Incidence submodel		Duration submodel	
	Before reform	After reform	Before reform	After reform
<i>Parity progression 1→2</i>	↔		↔	
High (ISCED5–8)	1.39 (0.000) +58 pp	1.97 (0.000)	1.08 (0.001) -32 pp	0.76 (0.000)
Medium (ISCED3–4)	1 +31 pp	1.31 (0.000)	1 -17 pp	0.83 (0.000)
Low (ISCED0–2)	0.77 (0.002) +33 pp	1.10 (0.141)	0.65 (0.000) +15 pp	0.80 (0.000)
<i>Parity progression 2→3</i>				
High (ISCED5–8)	1.27 (0.003) +61 pp	1.88 (0.000)	1.20 (0.001) -35 pp	0.85 (0.000)
Medium (ISCED3–4)	1 +34 pp	1.34 (0.000)	1 -19 pp	0.81 (0.000)
Low (ISCED0–2)	1.31 (0.010) +3 pp	1.34 (0.000)	0.62 (0.000) +4 pp	0.66 (0.000)



Exponentiated coefficients of the policy variable interacted with women's **ethnicity** for progression to **second and third birth** (mixture cure model), women born 1960–1999, Estonia

	Incidence submodel		Duration submodel	
	Before reform	After reform	Before reform	After reform
<i>Parity progression 1→2</i>	↔		↔	
Estonians	1 +19 pp	1.19 (0.001)	1 -10 pp	0.90 (0.000)
Other ethnic groups	0.49 (0.000) +13 pp	0.62 (0.000)	1.54 (0.000) -28 pp	1.26 (0.000)
<i>Parity progression 2→3</i>				
Estonians	1 +32 pp	1.32 (0.000)	1 -16 pp	0.82 (0.000)
Other ethnic groups	0.49 (0.000) +22 pp	0.71 (0.000)	0.96 (0.423) -1 pp	0.95 (0.136)



Summary

- ▶ **H1: Strongest acceleration** among **highly educated** women *Confirmed*
By contrast, birth intervals lengthened among the low-educated, especially for 2nd births.
- ▶ **H2: Largest increase** in fertility **quantum** among **highly educated** women *Confirmed*
Low-educated women also exhibited an increase in the progression to 2nd birth, suggesting an income effect
- ▶ **H3: Strongest acceleration** among **Estonian** women *Partly confirmed*
Shortening of 2nd birth interval is more pronounced among other ethnic groups
- ▶ **H4: Largest increase** in fertility quantum among Estonian women *Confirmed*
Women from other ethnic groups also experienced a significant increase



PS Benefits of using a mixture cure model

From the methodological point of view, **the analysis highlights the advantages** of mixture cure models:

- ▶ With conventional event history models, we would **not** have been **able to distinguish** clearly **the positive quantum effect** from the **shortening on birth intervals**, associated the PL reform
- ▶ Furthermore, with conventional event history models, the **positive quantum effect** would have been **overshadowed by** a concurrent **shift towards longer birth intervals** among the low-educated women



Thank you for listening!

