Regional variation in the educational gradient of fertility. 
The case of Belgium

Education and reproduction in low-fertility settings (EDUREP), 
Vienna, 2–4 December 2015

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Education & fertility

- **Educational enrolment and birth postponement** (Neels and De Wachter 2010; Ni Bhrolchain and Beaujouan 2012).
  - Roles of student and parent as well as structural conditions (e.g. time, resources) are incompatible (Blossfeld and Huinik 1991; Kravdal and Rindfuss 2008; Lappegård and Rønsen 2005).

- **Educational attainment and lower fertility**
  - Microeconomic: higher opportunity costs whereas income effect is limited due to quality-quantity trade-off (Becker and Lewis 1973; Becker 1991).
  - SDT theory: education - ideational change (higher-order needs; self-realization, autonomy) - emergence of sub-replacement fertility (Van de Kaa 2002; Lesthaeghe 2010).
  - Various paths to uncertainty reduction (Friedman et al., 1994). “We argue that the impetus for parenthood is greatest among those whose alternative pathways for reducing uncertainty are limited or blocked” (p383).
Education & fertility

• Context (place and time)
  • Recent SDT contributions increasingly draw attention to the impact of institutional context in shaping fertility outcomes (Lesthaeghe 2010).
  • Institutional setup (Liefbroer & Corijn, 1999; Rindfuss & Brewster, 1996).
  • Gender context (Goldscheider, Bernhardt, & Lappégaard, 2015).
  • Human development (Myrskylä et al. 2009).
  • Well-developed countries with relatively long traditions concerning family support and gender equality (e.g. Nordic European countries).

• Empirical research: context matters
  • Negative gradient in first birth transitions which vary in strength depending on the country considered (Van Bavel 2006, Oláh and Bernhardt 2008; Rønsen and Skrede 2010; De Wachter and Neels 2011; Fagnani 2002; Liefbroer and Corijn 1999; Bagavos 2010; Parr 2004; Muresan and Hoem 2010; Kharkova and Andreev 2000; Kreyenfeld 2004; Wood, Neels and Kil 2014).
  • Varying educational gradients in 2nd and higher births depending on the country considered (Kreyenfeld 2002; Bratti 2003; Andersson, Hoem, and Duvander 2006; Köppen 2006; Kravdal and Rindfuss 2008; Caltabiano, Castiglioni, and Rosina 2009; Muresan and Hoem 2010; Neels and De Wachter 2010; Rønsen and Skrede 2010; Berent 1970; Kharkova and Andreev 2000; Kreyenfeld 2004; Koytcheva 2006; Gjonca, Aassve, and Mencarini 2008; Muresan 2008; Moskoff 1980; Perelli-Harris 2008; Muresan and Hoem 2010; Klesment and Puur 2010; Wood, Neels and Kil 2014).
Project aim

• Regional differences in education-fertility in Belgium
  • (~France) Relatively well-developed in terms of reconciliation (e.g. childcare) and outsourcing (e.g. service vouchers) policies (Gornick, Meyers, & Ross, 1997; Klüsener, Neels, & Kreyenfeld, 2013; Raz-Yurovich, 2014); Relatively favorable attitudes toward work-family combination.
  • Little variation in overall fertility outcomes across educational groups (Klüsener, Neels & Kreyenfeld, 2013; Wood, Neels & Kil, 2014).

• Educational gradient of fertility, less frequently studied at subnational level
  • Similarly to research on cross-national differences in demographic behaviour, varying patterns by region may result from contextual effects, spurious relations, composition effects, selective migration.
    • Advantage vs cross-national approach: country-characteristics are fixed.
    • Disadvantage vs cross-national approach: (selective) migration is more likely.
  • Difference vs cross-national approach: interpretation of contextual indicators (e.g. Unemployment)
Research questions

To which degree does the educational gradient in fertility vary at the subnational level?

Does variation in the educational gradient coincide with economic and institutional development?
Subnational variation

Variation by:

- 579 municipalities
- 17 urban influence areas

(Willaert, Surkyn, & Lesthaeghe, 2000)
Individual level (N: 8,898,843)

- **Data:**
  - Exclude students (2001).
  - Age 15-49.

- **Method:**
  - Logit models of birth hazards (2002-2005):
    - Fixed effects:
      - 1st birth: splines + quadratic exposure, N: 3,337,420 person-years.
      - 2nd birth: step function + linear exposure, N: 2,394,619 person-years.
      - 3rd birth: step function + linear exposure, N: 3,166,804 person-years.
    - Random effect at the municipality level.
  - Approximate the observed variation in birth hazards; but also provide more stability.
  - Use estimated hazards to calculate $SPPR_{1-3}$ by educational level and municipality.

$$SPPR_t^1 = 1 - \prod_{i=0}^{35} \left(1 - \hat{h}_i^t\right)$$
Municipality level (N: 579)

• Data:
  • Economic conditions:
    • Male unemployment rate (regional employment offices, 2001-2004)
    • Female unemployment rate (regional employment offices, 2001-2004)
    • Median income (Statistics Belgium, 2001-2004)
    • Prosperity index (Statistics Belgium, 2001-2004)
  • Childcare (regional childcare offices, 2001-2004)
  • Perceived neighbourhood facilities (2001 census):
    • Public transport, shops, Health care services, Administrative services, non-medical Practitioner, Social services, schools, Nurseries and daycare centers, Culture and recreation.
  • Share of non-Belgians (Statistics Belgium, 2001-2004)
  • Population/population density (Statistics Belgium, 2001-2004)

• Method
  • Linear regression models of differential SPPR\textsubscript{1-3} for high educated women (High-Medium, High-Low).
Educational differentials in Synthetic Parity Progression Ratios (SPPR1) 2002-2005, 579 Belgian municipalities, 17 urban influence areas
Descriptive Results

Educational differentials in Synthetic Parity Progression Ratios (SPPR2) 2002-2005, 579 Belgian municipalities, 17 urban influence areas

H-M

H-L
Descriptive Results

Educational differentials in Synthetic Parity Progression Ratios (SPPR3) 2002-2005, 579 Belgian municipalities, 17 urban influence areas
Descriptive Results

Economic deprivation (factor scores), 579 Belgian municipalities, 17 urban influence areas

<table>
<thead>
<tr>
<th>Variable</th>
<th>Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male unemployment rate</td>
<td>.8686</td>
</tr>
<tr>
<td>Female unemployment rate</td>
<td>.9139</td>
</tr>
<tr>
<td>Median income</td>
<td>-.8384</td>
</tr>
<tr>
<td>Prosperity index</td>
<td>-.7268</td>
</tr>
</tbody>
</table>
Descriptive Results

Childcare coverage (capacity/population 0-3), 579 Belgian municipalities, 17 urban influence areas
Descriptive Results

Perceived facilities (factor scores), 579 Belgian municipalities, 17 urban influence areas

How do you rate your neighborhood in terms of:

<table>
<thead>
<tr>
<th>Variable</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Public transport</td>
<td>.6696</td>
</tr>
<tr>
<td>shops</td>
<td>.8483</td>
</tr>
<tr>
<td>Health care services</td>
<td>.8664</td>
</tr>
<tr>
<td>Administrative services</td>
<td>.7004</td>
</tr>
<tr>
<td>non-medical Practitioner</td>
<td>.9611</td>
</tr>
<tr>
<td>Social services, schools</td>
<td>.9206</td>
</tr>
<tr>
<td>Nurseries and daycare centers</td>
<td>.8104</td>
</tr>
<tr>
<td>Culture and recreation</td>
<td>.8661</td>
</tr>
</tbody>
</table>

Map showing the distribution of perceived facilities across 579 Belgian municipalities.
Multivariate Results

Effect of context characteristics on the educational gradient of SPPR$_{1-3}$

<table>
<thead>
<tr>
<th></th>
<th>SPPR1</th>
<th>SPPR2</th>
<th>SPPR3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic deprivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Econ (factor score)</td>
<td>-.610 ***</td>
<td>-.745 ***</td>
<td>-.483 ***</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>.18</td>
<td>.27</td>
<td>.12</td>
</tr>
<tr>
<td>Childcare coverage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Capacity/Pop 0-3</td>
<td>.253 *</td>
<td>.043</td>
<td>.228 ***</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>.03</td>
<td>.00</td>
<td>.02</td>
</tr>
<tr>
<td>Perceived quality of facilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>. Econ (factor score)</td>
<td>.444 ***</td>
<td>.632 ***</td>
<td>.323 ***</td>
</tr>
<tr>
<td>$\Delta R^2$</td>
<td>.12</td>
<td>.24</td>
<td>.06</td>
</tr>
<tr>
<td>N</td>
<td>579</td>
<td>579</td>
<td>579</td>
</tr>
</tbody>
</table>

Significance levels: $p < .050$ (*), $p < .010$ (**), $p < .001$ (***)

Controlling for 17 urban influence areas, population density, Population (%) with non-Belgian nationality
Multivariate Results

Effect of influence area on differential SPPR1


Background – Research questions – Data & Method – Results – Conclusions
Multivariate Results

Effect of influence area on differential SPPR1


Background – Research questions – Data & Method – Results – Conclusions

Effect of influence area on differential SPPR1
Effect of influence area on differential SPPR1

Multivariate Results

**Effect of influence area on differential SPPR1**


- Bergen
- La Louviere
- Luik
- Brussel
- Verviers
- Hasselt-Genk
- Antwerpen
- Gent
- Doornik
- Oostende
- Charleroi
- Aalene
- Brugge
- Roeselare
- Kortrijk
- Leuven


- Bergen
- Brussel
- Luik
- La Louviere
- Antwerpen
- Gent
- Hasselt-Genk
- Verviers
- Namur
- Charleroi
- Doornik
- Oostende
- Leuven
- Aalene
- Brugge
- Roeselare
- Kortrijk

- Obs
- Economic conditions
- childcare coverage
- Perceived quality of facilities
Multivariate Results

Effect of influence area on differential SPPR1


- Obs
- Economic conditions
- Childcare coverage
- Perceived quality of facilities
Effect of influence area on differential SPPR2


Effect of influence area on differential SPPR2
Multivariate Results

Effect of influence area on differential SPPR2


- Obs
- Economic conditions
- Childcare coverage
- Perceived quality of facilities
Multivariate Results

Effect of influence area on differential SPPR2


- Obs
- Economic conditions
- Childcare coverage
- Perceived quality of facilities
Effect of influence area on differential SPPR3

SPPR3(2002-2005) Difference M-L


- Obs
- Economic conditions
- childcare coverage
- Perceived quality of facilities
Multivariate Results

Effect of influence area on differential SPPR3

SPPR3(2002-2005) Difference M-L


Observation
Economic conditions
Childcare coverage
Perceived quality of facilities
Effect of influence area on differential SPPR3

SPPR3(2002-2005) Difference M-L


- Obs
- Economic conditions
- Childcare coverage
- Perceived quality of facilities
Effect of influence area on differential SPPR3

SPPR3(2002-2005) Difference M-L


- Obs
- Economic conditions
- childcare coverage
- Perceived quality of facilities
Conclusions

• First conclusions:
  • The overall educational gradients in Belgium mask strong regional variation.
  • Strong regional variation in economic and institutional development.
  • Economic and institutional development ~ weaker negative or stronger positive educational gradients.
  • Predictive value: Economic deprivation > Perceived facilities > childcare coverage.

• Future work
  • Model birth hazards with predictors at individual and municipality level.
    • Control for household position, migrant background, employment status, ..
    • Use predicted hazards to calculate SPPR\textsubscript{1-3} by municipality and level of education.
  • Assess selective migration.
  • Assess spatial autocorrelation.
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Share of population (%) with non-Belgian nationality
### Multivariate Results

#### Effect of context characteristics on the educational gradient of SPPR\textsubscript{1-3}

<table>
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<th>SPPR3</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diff H-M</td>
<td>beta</td>
<td>Diff H-L</td>
</tr>
<tr>
<td>Sig</td>
<td></td>
<td>Sig</td>
</tr>
<tr>
<td>.464</td>
<td>***</td>
<td>.507</td>
</tr>
</tbody>
</table>

#### Economic conditions

- *Econ (factor score)*
  - .464 ***
  - .507 ***
  - .373 ***
  - .391 ***
  - .484 ***
  - .456 ***

#### Childcare coverage

- *Capacity/Pop 0-3*
  - .109 *
  - .125 **
  - .102 *
  - .010
  - .059
  - .041

#### Perceived quality of facilities

- *Econ (factor score)*
  - .082
  - .195 ***
  - .007
  - .183 ***
  - .143 **
  - .389 ***

| N | 579 | 579 | 579 | 579 | 579 | 579 |

Significance levels: p < .050 (*), p < .010 (**), p < .001 (***)

Controlling for 17 urban influence areas, population density, Population (%) with non-Belgian nationality
Multivariate Results

![Graph showing the results of multivariate analysis with different variables and categories.]

- **SPPR1**
- **SPPR2**
- **SPPR3**