Gendered Time Constraints
and Public Transport Accessibility

A Multilevel Analysis of Well-being in Spain

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Presentation Outline

Time Poverty: An Invisible Dimension of Well-being

What is Time Poverty?

A condition in which individuals have **fewer hours** than required to meet their work, caregiving, and personal obligations → a deprivation of well-being even in the absence of monetary poverty.

The "Care Penalty"

The mismatch between existing infrastructure and care geometries turns travel time into a **time tax** that aggravates time poverty.

- Women perform a disproportionate share of unpaid domestic and care work.
- Transport planning operates under a gender-blind paradigm centered on linear commuting (male-dominated patterns).
- Female mobility patterns respond to the **mobility of care**: trip chaining, escorting dependents, rigid

Sánchez de Madariaga (2013); Rodgers (2023); Zehba et al. (2025)

Literature Gap and Main Contributions

What exists:

- Gender and mobility studies (Central/Northern Europe)
- Time poverty in developing nations
- Transport accessibility and social exclusion

What is missing:

- Intersectional + territorial analysis in Southern Europe
- Direct connection between *satisfaction with transport* and *time use*
- Distributive perspective (upper tail of the distribution)

Paper Contributions

1. Classical and RIF Oaxaca-Blinder decomposition
2. Binary time poverty analysis
3. **Multilevel** linear regression model (Autonomous Communities of Spain)

Central Question

Why doesn't satisfaction with public transport translate into equal time-use benefits for men and women?

Data

Sample

Total N	1,500 working-age adults
Women (Group A)	735
Men (Group B)	765
Coverage	Spanish Auton. Comm. (19)

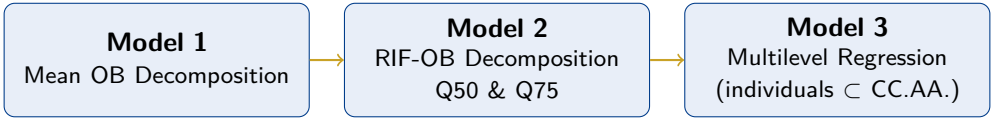
Dependent Variable: daily travel time in hours (quarter-hour intervals: $\{0; 0.25; 0.50; \ldots\}$)

Main Covariates:

- `P15A`: number of children in the household
- `P15B`: other dependents
- `P1_ACCESO_6`: satisfaction with PT access
- `P1_ACCESO_4`: satisfaction with local infrastructure
- `P20_rural`: rural residence
- `P18_superior`: higher education
- `P21`: age proxy
- `P23`: immigrant status

Time Poverty Indicator: $Y_i = 1$ if travel time exceeds the 75th percentile of the joint distribution (≈ 2.19 h for women).

Empirical Strategy in Three Layers



- **Classical OB**: endowment components vs. coefficients (differential returns).
- **RIF-OB**: Recentered Influence Function → decomposition at unconditional quantiles (Firpo, Fortin & Lemieux 2009).
- **Multilevel**: random intercept by Autonomous Community; captures territorial heterogeneity.

Descriptive Statistics: Raw Gaps

Travel Time (hours)

	Women	Men	Gap
Mean	0.361	0.353	+0.008
Median	1.300	1.262	+0.038
P75	2.193	2.179	+0.015

% classified as "time poor":
Women 36.1% vs. Men 35.3%

Key Finding

Raw gaps are deceptively small. They conceal asymmetric structural mechanisms that cancel out at the mean but accumulate in the upper tail, where time poverty is actually defined.

Model 1: Mean Oaxaca-Blinder Decomposition

Aggregate Result (hours):

$$\underbrace{+0.008}_{\Delta \bar{Y}} = \underbrace{-0.006}_{\text{Endowments}} + \underbrace{+0.011}_{\text{Coefficients}} + \underbrace{+0.002}_{\text{Interaction}}$$

$\Rightarrow$ The gap is **not** driven by differences in observable characteristics, but by differential returns.

Dynamics by Variable:

- P15A (children): $+1.5$ extra min/child for women; neutral for men.
- P15B (dependents): spatial compression is **3×** greater for women.
- P18$_s$*uperior* : *reducestraveltimeby*5.7*minforwomen*; *increasesitformen*.

Key Finding

The "coefficients component" is the structural driver. Even when balancing all observable characteristics, women bear a travel time penalty generated by the care economy rather than their individual endowments.

Model 2: RIF Decomposition — Distributive Heterogeneity

Selected RIF Coefficients (hours)

	Q50		Q75	
Variable	$\hat{\beta}_A$	$\hat{\beta}_B$	$\hat{\beta}_A$	$\hat{\beta}_B$
Children (P15A)	+.026	.072	+.042	.001
Depend. (P15B)	.040	.023	.060	.018
PT Access Acc.	+.006	+.004	+.007	+.005
Higher Ed.	+.006	+.032	.118	+.047
Immigrant	.061	+.052	.050	+.144

- The child penalty asymmetry **accelerates** at Q75: women closest to the poverty threshold shoulder the heaviest additional burden of trip chaining.
- Higher education acts as a **shield** against severe time poverty (-7.1 min at Q75).

Key Finding

Mean analysis systematically underestimates the true penalty. The impact is **non-linear**: it intensifies precisely around the poverty threshold.

Binary Time Poverty: Probability Decomposition

Aggregate Result (probability difference):

$$\underbrace{+0.0085}_{\Delta \bar{Y}} = \underbrace{-0.0044}_{\text{Endowments}} + \underbrace{+0.0108}_{\text{Coefficients}} + \underbrace{+0.0021}_{\text{Interaction}}$$

Contributions by Variable:

- P15A: +4.3 p.p. penalty per child → **largest individual contributor**.
- $\text{P18}_{superior}$:-9.5*p.p.differential*→ buffer effect for women.
- P23 (immigrant): $\beta_A = -2.9$; $\beta_B = +8.3$ → gender-migration intersection.

Key Finding

Women face a structural penalty of **1.1 p.p.** in the probability of entering severe time poverty, robust across all 6 weighting schemes (range: 1.05–1.29 p.p.). This penalty is entirely generated by differential returns, not endowments.

Model 3: Multilevel Regression — Main Results

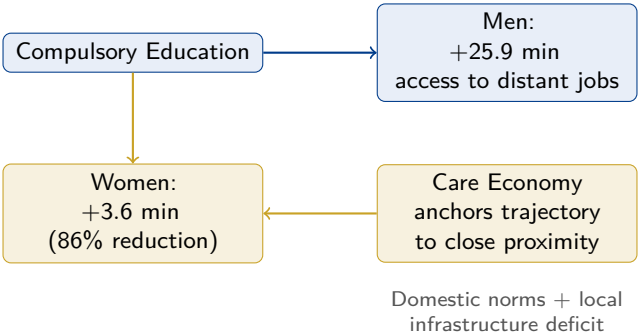
Predictor	$\hat{\beta}$	SE	Sig.
(Intercept)	0.979	0.277	***
PT — access satisfaction	0.025	0.012	**
Household composition	0.047	0.019	**
Local infra. ($P1_A CCESO_4$)	0.012	0.015	
Compulsory education	0.431	0.129	***
Woman	0.329	0.255	
Rural residence	0.116	0.070	*
Interactions			
Comp. education × Woman	0.371	0.177	**

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Three Structural Findings:

1. **Infrastructure Specificity**: Only the PT network matters; neighborhood-level infrastructure is statistically irrelevant.
2. **Intersectional Neutralization**: Education adds +26 min of reach for men, but only +4 min for women (an 86% reduction).
3. **Rurality**: −7 min driven by *spatial imprisonment* rather than efficiency.

The "Spatial Education Penalty": Mechanism



Investment in human capital does not translate into spatial and temporal autonomy for women. The educational dividend is **appropriated** by unpaid reproductive labor.

Synthesis: The "Space-Welfare Paradox"

Central Mechanism

The strategies women use to manage the care economy simultaneously generate:

1. *An illusion of time efficiency* → shorter average trip durations.
2. *A structural time-poverty premium* → accumulated at the upper tail of the distribution (Q75), where welfare costs are highest.

The Quarter-Hour as a Structural Unit:
School hours, care windows, and PT connections operate in 15-minute intervals. The identified gaps (1.5–5.7 min), when aggregated throughout the day, push individuals over the poverty line.

Urban Space as a Gender Regime:
Built infrastructure does not passively mirror gender inequalities: it **actively amplifies them** by ignoring the spatial geometry of care mobility.

Public Policy Implications

1. **Redirect Transport Investment**
   Shift from radial, commute-focused networks to capillary systems with high off-peak frequency, explicitly mapped around 15-minute care itineraries.
2. **Mixed-Use Zoning**
   Co-locate housing, childcare facilities, and employment nodes to diminish the friction of trip chaining.
3. **On-Demand Transport Subsidies (Rural)**
   In low-density rural and peri-urban areas, public transport deficits confine women spatially.
4. **Integrated Evaluation Frameworks**
   Embed gender-disaggregated time poverty metrics into standard urban planning cost-benefit analyses.

Structural, Not Incremental Reform

Updating infrastructure without shifting domestic norms — or vice versa — will only deliver partial gains. Both dimensions are deeply co-constitutive.

Conclusions

Three Main Takeaways

1. **Space-Welfare Paradox**: Women's forced spatial compression minimizes average travel times but creates a structural time-poverty premium at the Q75 threshold.
2. **Infrastructure Specificity**: Only public transport network connectivity significantly changes time-use outcomes; generic neighborhood upgrades are statistically inert.
3. **Intersectional Neutralization**: The spatial dividend of compulsory education drops by 86% for women, confirming that human capital policies cannot close the gap without parallel spatial and domestic reforms.

Gender equality in time use will remain systematically undermined by the spatial architecture of daily life unless these structural transformations are realized.

Thank you very much

Questions & Discussion

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Main References I

- Firpo, S., Fortin, N.M., Lemieux, T. (2009). Unconditional quantile regressions. *Econometrica*, 77(3), 953–973.
- Folbre, N. (2006). Measuring care. *Journal of Human Resources*, 41(2), 401–418.
- Rodgers, Y. (2023). Time poverty as a form of deprivation. *Feminist Economics* [cit. in text].
- Sánchez de Madariaga, I. (2013). From "mobility in general" to "mobility of care". In *Gendered Mobilities* (pp. 57–72). Routledge.
- Bardasi, E., Wodon, Q. (2010). Working long hours and having no choice. *Feminist Economics*, 16(3), 45–78.
- Hochschild, A.R., Machung, A. (2003). *The Second Shift*. Penguin.
- Raudenbush, S.W., Bryk, A.S. (2002). *Hierarchical Linear Models* (2nd ed.). Sage.
- Zehba et al. (2025). Women's urban mobility narratives in Kochi. *[Journal]*.
- Tran et al. (2024). Travel and subjective well-being. *[Journal]*.

Appendix: Robustness of the Penalty (6 Schemes)

Scheme	Weight	Explained	Unexplained	SE
Female Ref. (Group A)	0.000	0.006	+0.013	0.025
Male Ref. (Group B)	1.000	0.002	+0.010	0.026
Symmetric Compromise	0.500	0.004	+0.012	0.025
Reimers (1983)	0.490	0.004	+0.012	0.025
Cotton (1988)	1.000	0.004	+0.011	0.024
Neumark (1988)	2.000	0.004	+0.011	0.025

The unexplained penalty (coefficient component) ranges between **1.05 and 1.29 p.p.** and is entirely robust to the choice of the reference vector.