


# Modelling work place decisions in mobility biographies

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**Publication date:**

2014-05

**Permanent link:**

<https://doi.org/10.3929/ethz-b-000089668>

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## Preferred citation style for this presentation

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Ehreke, I. and Axhausen, K.W. (2014) Modelling work place decisions in mobility biographies, presentation at the *14<sup>th</sup> STRC Swiss Transport Research Conference*, Ascona, May 2014.

# Modelling work place decisions in mobility biographies

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May 2014



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# Outline

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- Project and basic information
- Study design and questionnaire
- Response burden
- Descriptive analyses
- Recurrent Event Survival Analysis: approach, estimation, results
- Outlook

# Background information

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Project	Mobility Biographies: A Life-Course Approach to Travel Behaviour and Residential Choice
Funding:	DFG/SNF
Realization:	IVT ETH Zurich TU Dortmund Goethe University Frankfurt
Duration:	(2007) April 2012 – exp. late 2015
Aim:	Analysis of the variation and stability of mobility behaviour in the life course
Sample size:	3972 (this analysis) / 4620 + (total)

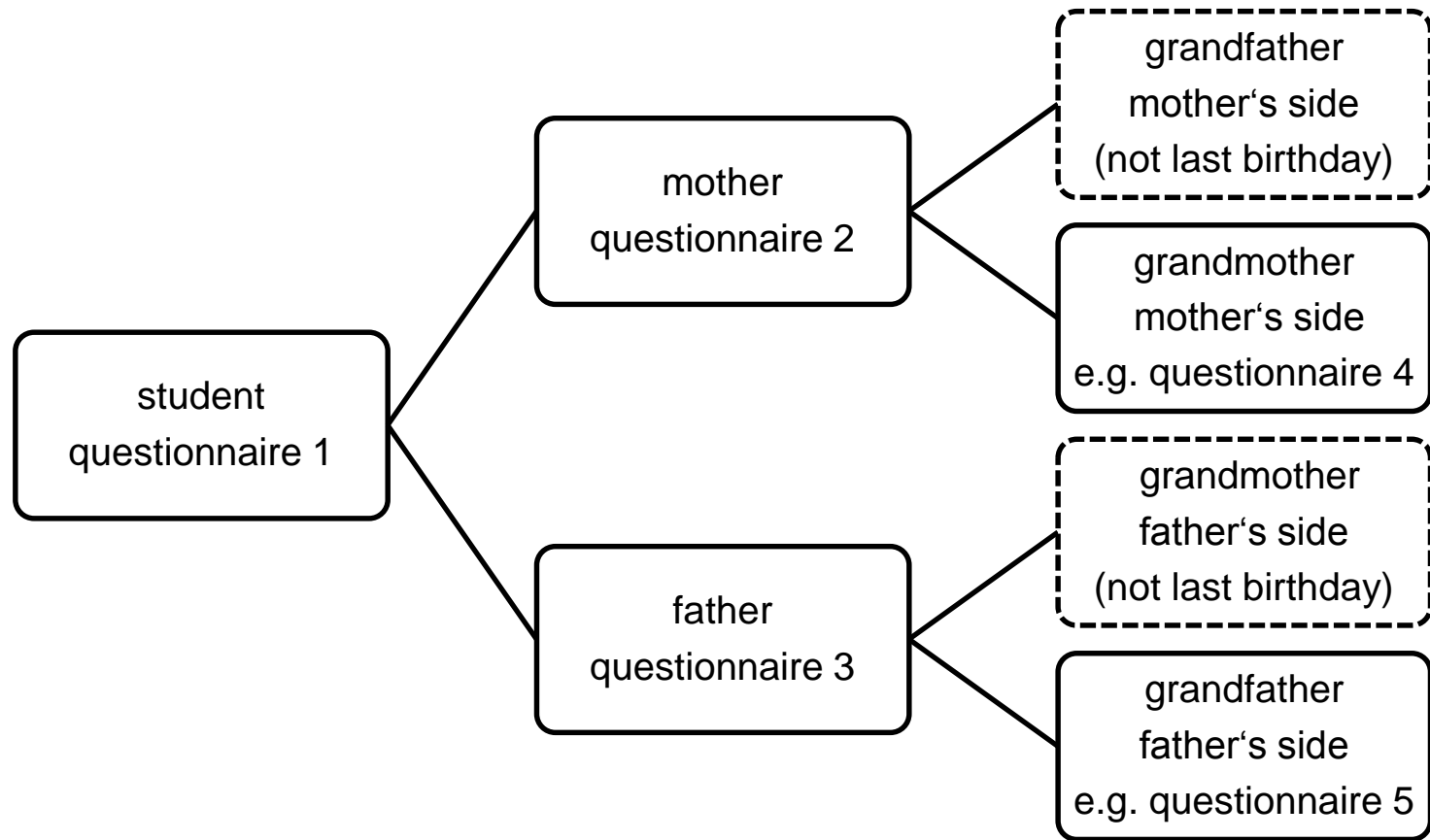
# Basics

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- Changes in mobility behavior are usually determined with static cross sectional surveys but these often don't account for the **dynamics of long term decision** (Lanzendorf 2003)
- Mobility biographies are the development **of travel demand in the life course** (Scheiner 2010)
- The mobility biography approach tries to capture and explain **travel behavior and mobility tool ownership during lifetime** (Scheiner 2006)
- **Key events** such as childbirth or starting the working career have an important influence on the individual mobility biography (Van der Waerden et al. 2003, Lanzendorf 2010, Klöckner 2003)
- **Theoretical framework** Axhausen (2002, 2007), Lanzendorf (2003), Scheiner (2003,2006), Van der Waerden et al. (2003)...
- **Empirical studies** Axhausen et al (2006), Frändberg (2006), Beige (2008) ...

# Study design - process

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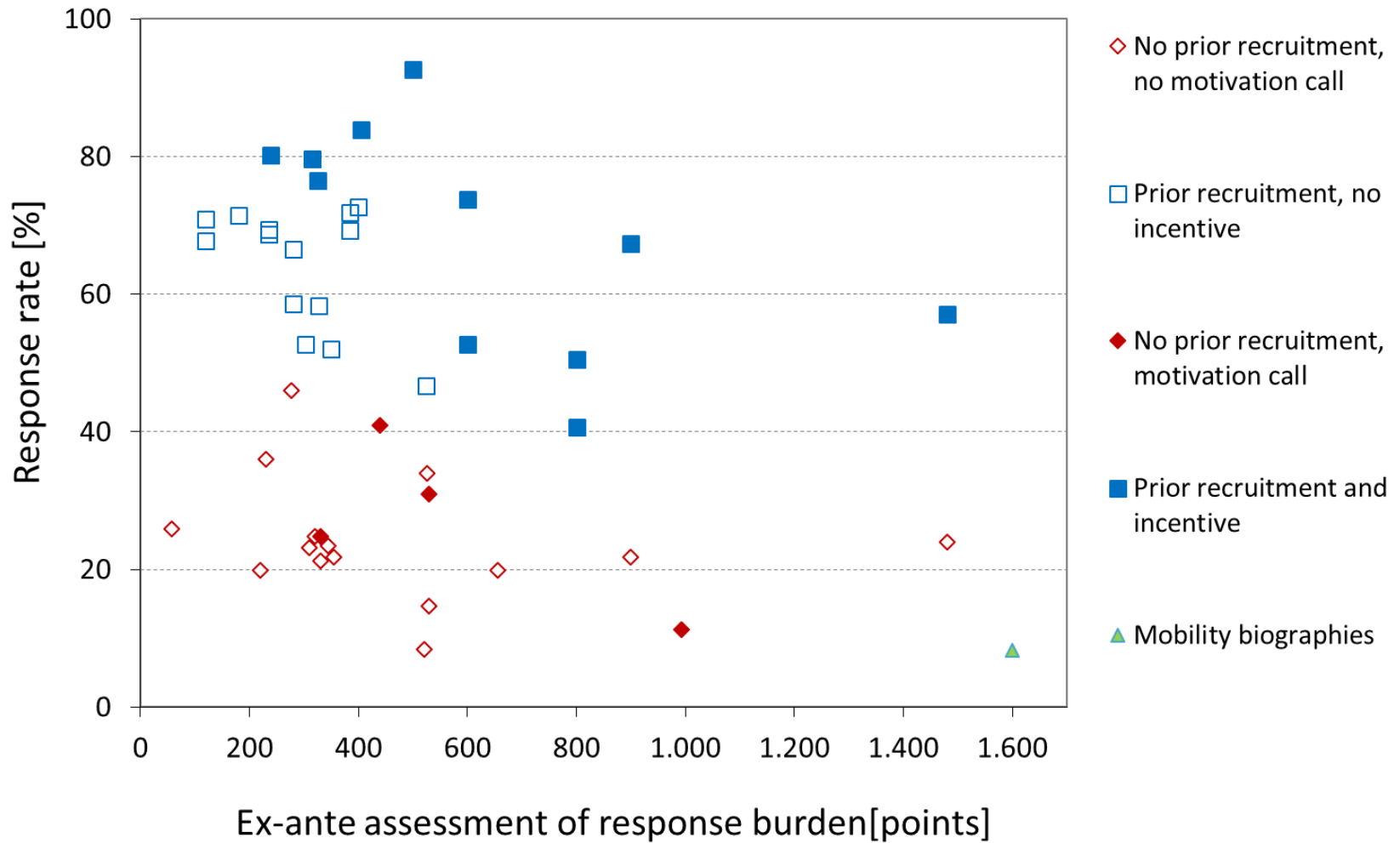
# Study design – questionnaire

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- Content:
  - Part A: residential relocation
  - Part B: everyday travel incl. employment biography
  - Part C: holiday travel
  - Part D: attitudinal questions
  - Part E: socio-demographic questions incl. mobility tools
- almost 50 questions per person
- 5 questionnaires per family



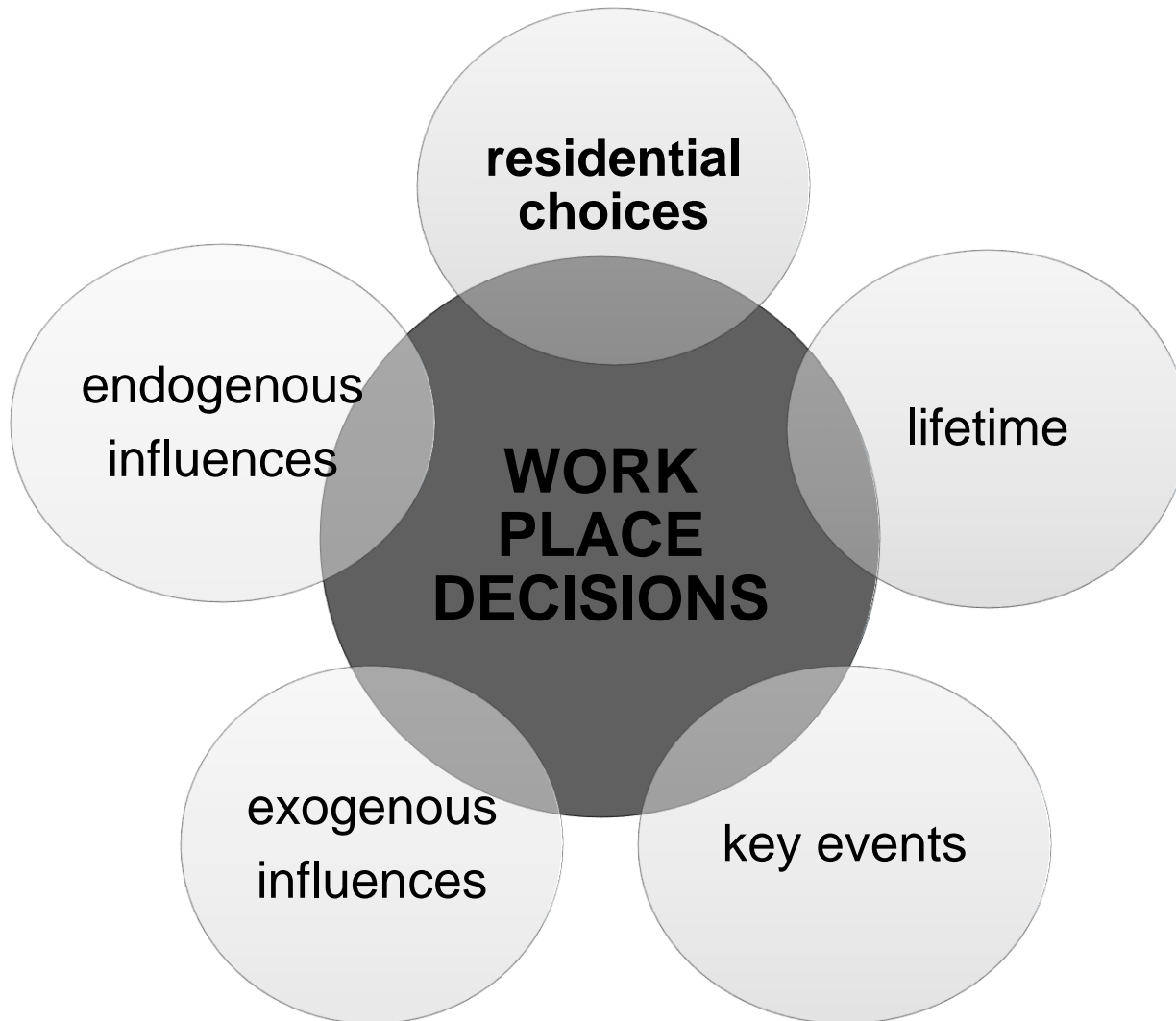
# Response burden



Axhausen and Weis (2010)

# Focus on work place decisions

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# Study design – employment biography

3. Wie sind Sie jeweils zur wichtigsten Arbeitsstelle gekommen ? Wenn sich die **Länge des Arbeitswegs oder das genutzte Verkehrsmittel geändert haben**, z.B. wegen eines Umzugs bitte eine neue Zeile ausfüllen.

Von (Jahr)	Bis (Jahr)	Stellen- prozente	Weg (ca. in km)	Haupt- verkehrs- mittel	Grund für die Änderung des Weges

...

Ich war nie erwerbstätig

Kodierung für das Hauptverkehrsmittel

- 1 = Zu Fuß
- 2 = Velo/Fahrrad
- 3 = ÖPNV
- 4 = Auto
- 5 = Mofa/Roller
- 6 = Motorrad
- 7 = Anders

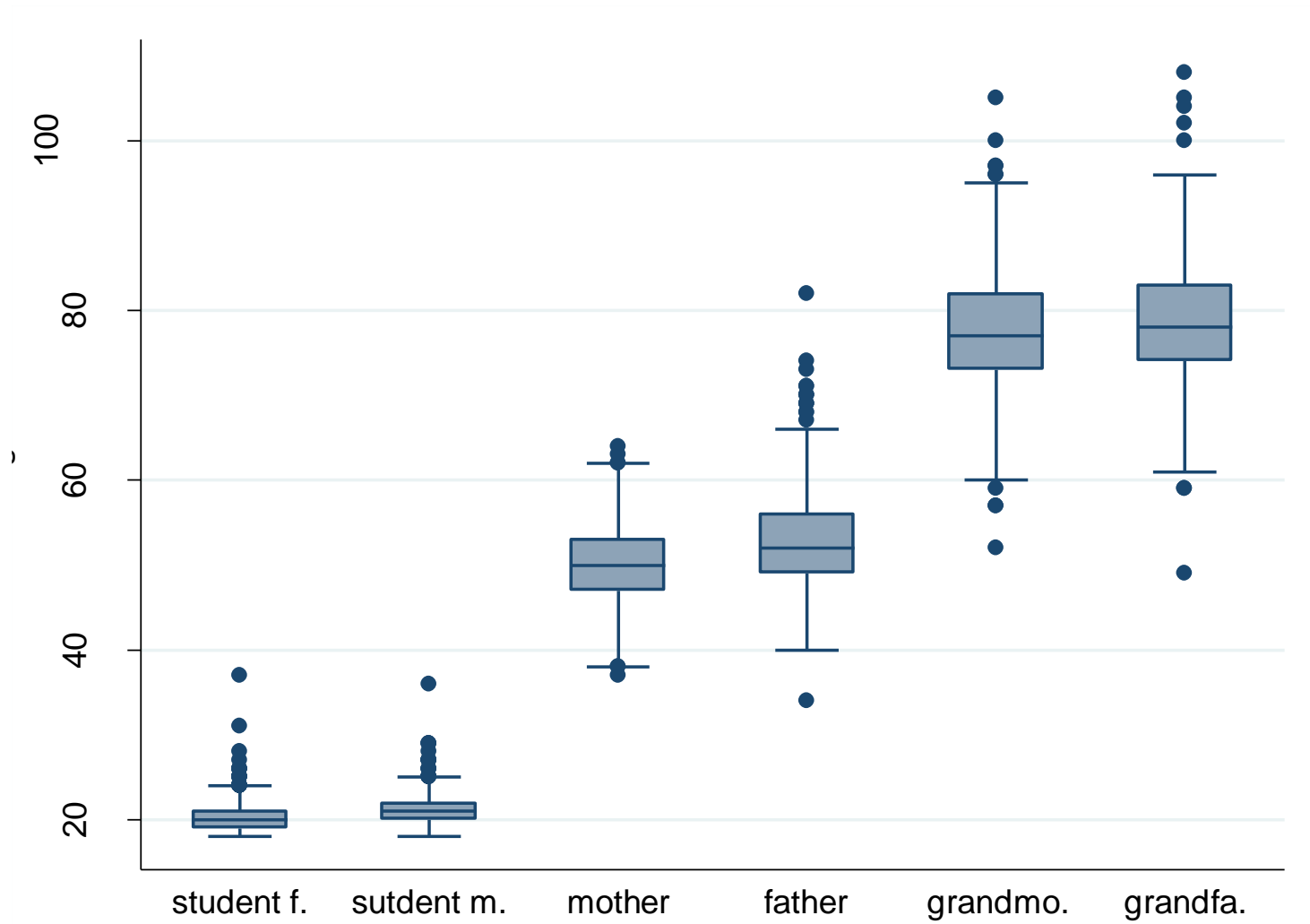
- beginning and ending of employment (in years)
- fulltime/part time (choice)
- distance to workplace (in km)
- main mode of transport (categories 1-7)
- reason for changing way to work (open)

# Reasons for changing way to work

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- workplace change
- start of working career
- higher income
- self employment
- retirement
- improve working conditions
- start/end high school/school/apprenticeship
- back to work after break
- relocation of employment
- promotion
- army / civilian service / voluntary work etc.

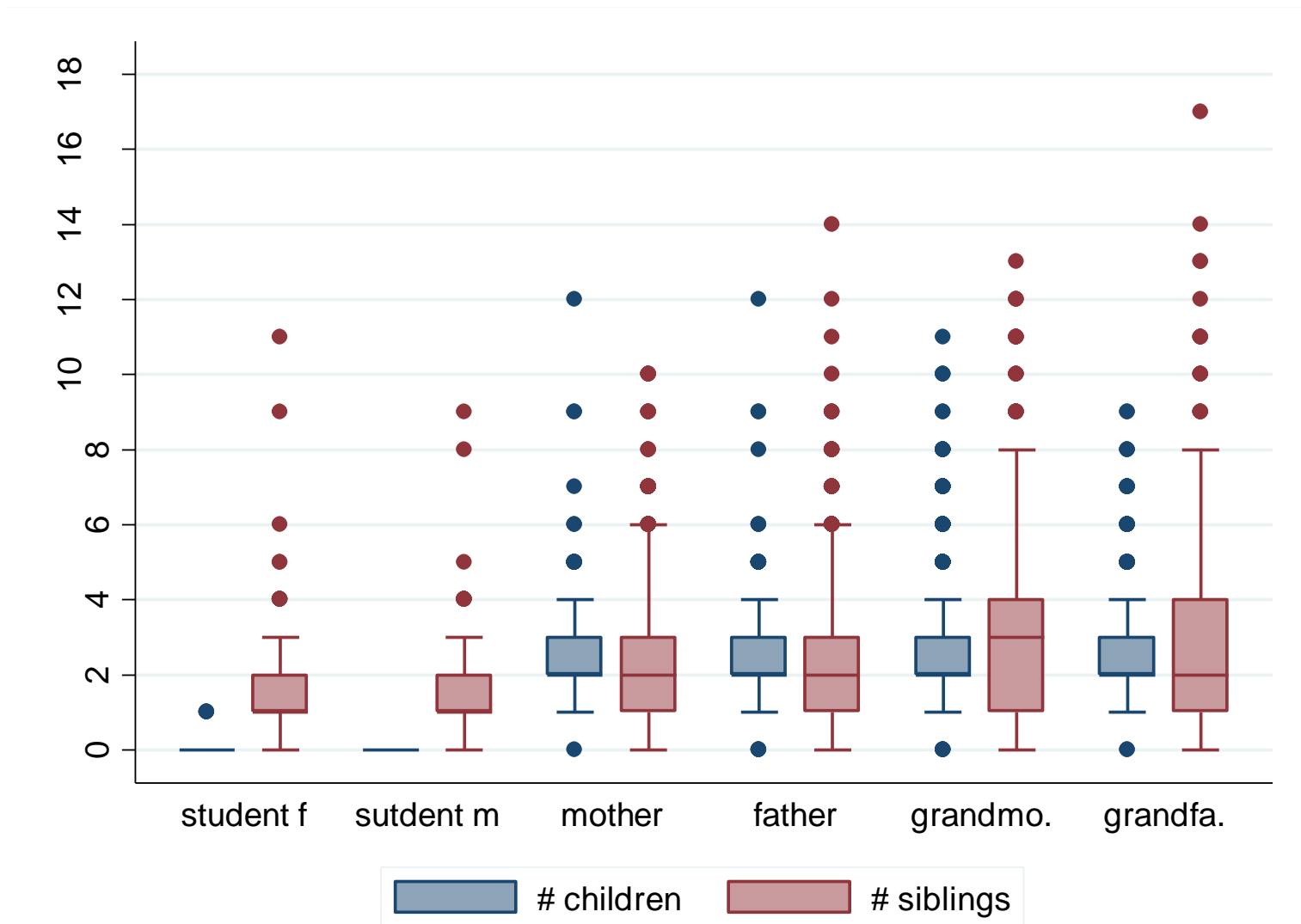
# Descriptive



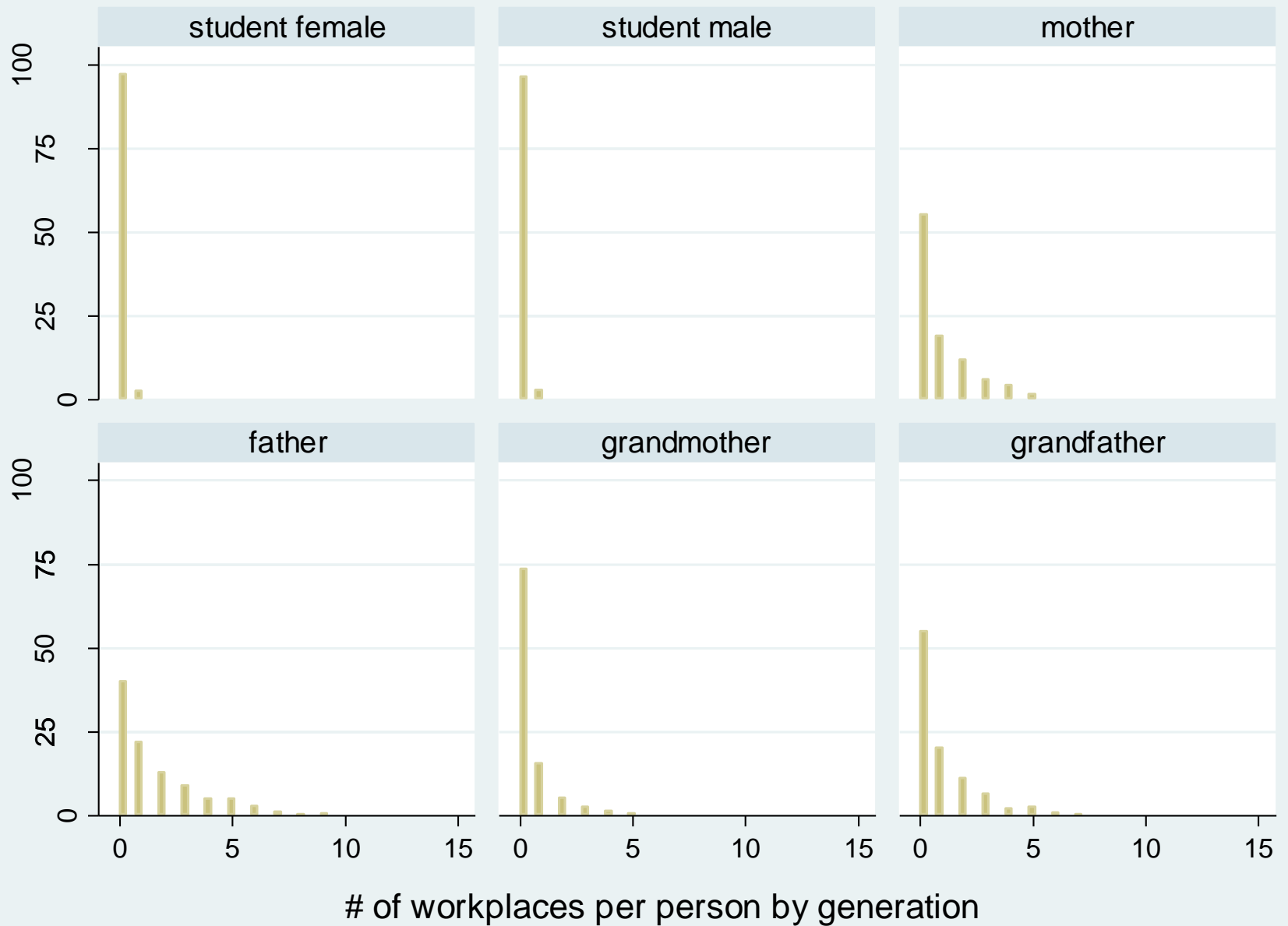
# Descriptive

<b>Attribute</b>	<b>Category</b>	<b>N</b>	<b>%</b>	<b>Attribute</b>	<b>Cat.</b>	<b>N</b>	<b>%</b>
Gen- eration	Student female	493	12%	University	Yes	693	17%
	Student male	425	11%		No	3,225	81%
	Mother	919	23%	Gender	Fem.	2,217	56%
	Father	852	21%		Male	1,755	44%
	Grandmother	805	20%	Married	Yes	2,990	75%
	Grandfather	478	12%		No	966	24%
	Total	3,972	100%	Divorced	Yes	493	12%
			No		3,455	87%	
Edu- cation	None	121	3%	Drivers license	Yes	3,370	85%
	GER Volksschule	790	20%		No	595	15%
	GER Hauptschule	364	9%	Car ownership	Yes	2,706	79%
	GER Realschule	678	17%		No	659	21%
	GER FH	334	8%	Annual/monthly PUT (>18)	Yes	1,997	50%
	GER Abitur	1,669	42%		No	1,943	49%
Appren- ticeship	Yes	2,334	59%	Bahncard (>18)	Yes	654	16%
	No	1,574	40%		No	3,298	83%

# Descriptive



# Descriptive





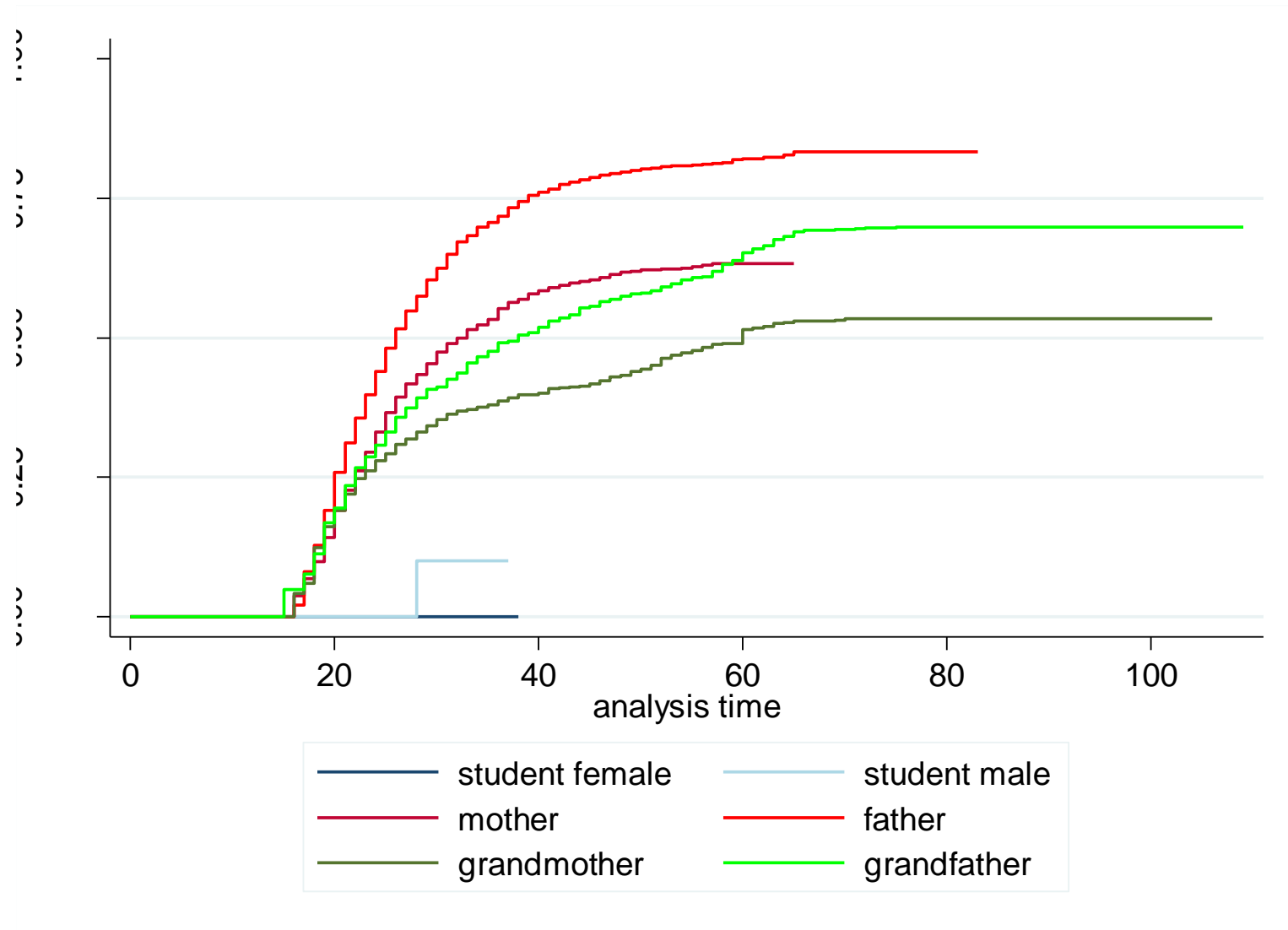
# Modelling approach

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- Recurrent Event Survival Analysis
  - events can occur more than once in a certain time interval at a certain time
  - censored by survey design
  - start time, stop time, status
  - $S(t) = \Pr(T > t)$
- Cox Proportional Hazard Model for counting process  
(Andersen et al., 1993)
  - influence of predictors on the survival/failure time
  - hazard ratio constant over time
  - robust variance estimates because correlation among recurrent events

$$h(t, \mathbf{X}) = h_0(t) e^{\sum_{i=1}^p \beta_i X_i}$$

# Kaplan-Meier failure time plot 1<sup>st</sup> event



# Estimation results Cox Regression

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No. of observation	34973	Log pseudolikelihood	-14384.64				
No. of subjects	3232	Wald chi2(9)	301.38				
No. Of failures	1964	Prob > chi2	0				
Time at risk	94814						
		Robust					
		Std.					
		Err.					
_t	Coef.		z	P> z	95% Interval		
Age	-0.01		0	-2.21	0.03	-0.01	0
University degree							
	No	0 (base)					
	Yes	0.51	0.08	6.65	0	0.36	0.67
Apprenticeship							
	No	0 (base)					
	Yes	0.25	0.09	2.67	0.01	0.07	0.44
Married							
	No	0 (base)					
	Yes	2.1	0.41	5.1	0	1.29	2.91
Divorced							
	No	0 (base)					
	Yes	0.28	0.08	3.44	0	0.12	0.43
Car Ownership							
	No	0 (base)					
	Yes	0.4	0.18	2.23	0.03	0.05	0.75
Gender							
	female	0 (base)					
	male	0.48	0.07	6.89	0	0.35	0.62

# Outlook – Modelling next steps

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- Integrate time trajectory of mobility tools and distance
- Analyze interdependences and influences between cohorts (mobility socialization)
- Analyze interdependences between employment and residential biography
- Include Frankfurt and Zurich data
- Look for other suitable modelling approaches

# Thank you very much! Questions?

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