Research Methods
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# Multilevel Multiprocess Models for Partnership and Childbearing Event Histories

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# Aims of Research

- Develop methodology for the analysis of correlated event histories

- Apply in an analysis of the link between partnership stability and childbearing
  - Examine effect of presence of children on separation and move from cohabitation to marriage, adjusting for correlation between partnership transitions and fertility

# Methodology: Overview I

- Consider all partnerships for ages 16-42 using multilevel modelling
- Estimate simultaneously models for 3 types of partnership transition:
  - Marriage → Separation
  - Cohabitation → Separation; Cohabitation → Marriage
- Estimate these transitions jointly with model for fertility to allow for potential endogeneity of fertility outcomes

# Methodology: Overview II

- Use multilevel multistate discrete time event history model (Steele et al. 2004) for partnership transitions
  - 'States' are marriage and cohabitation
  - Competing risks from cohabiting state

- Estimate jointly with model for conceptions within partnerships using simultaneous equation (multiprocess) model (extending Lillard (1993) who considers only marriage)

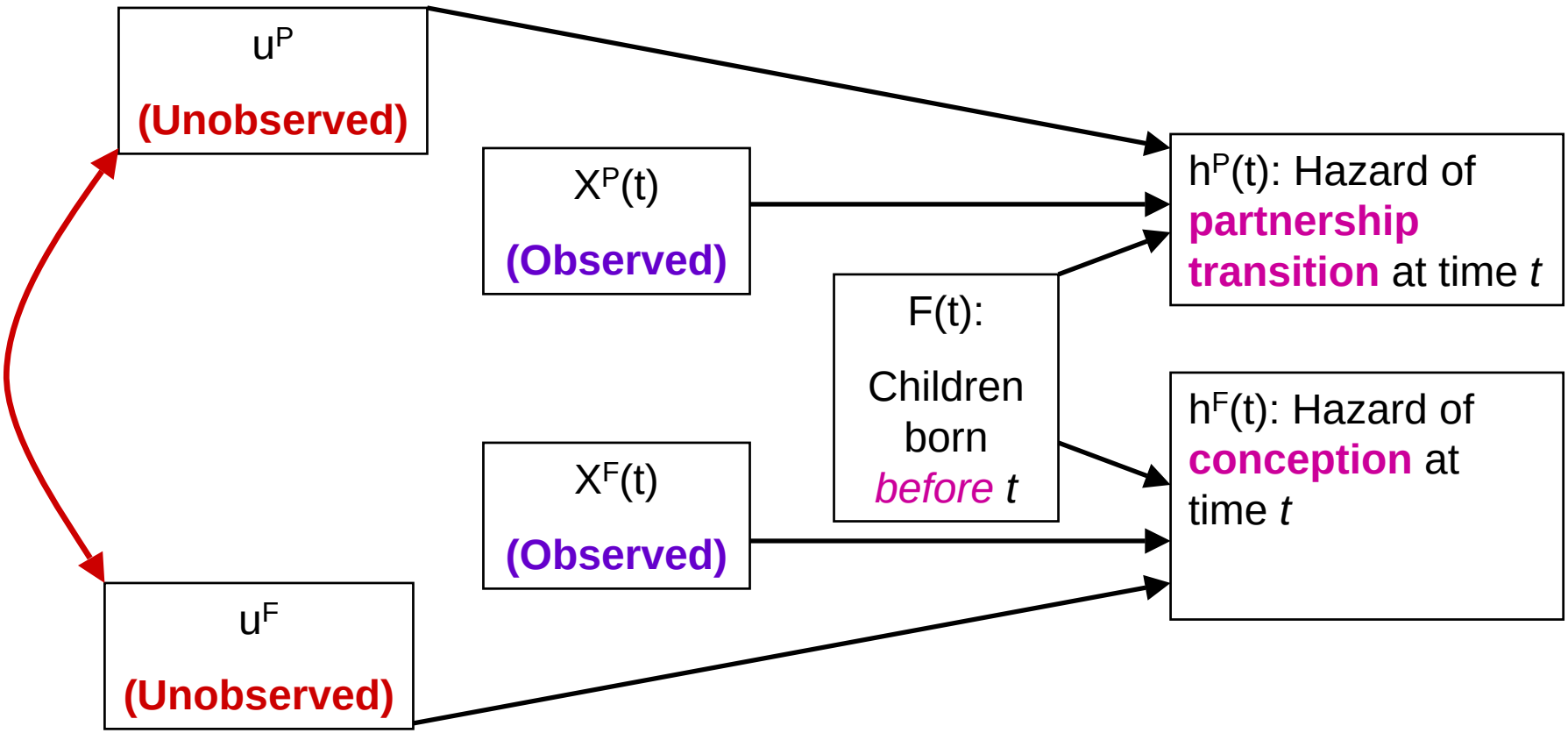
- Multilevel data structure: repeated partnerships and births (level 1) within individuals (level 2)

- Estimation using MCMC in *MLwiN v.2*

# Endogeneity of Prior Fertility Outcomes

- Interested in effect of presence of children on partnership transitions
- But children are prior outcomes of a potentially correlated process (fertility)
- There may be factors (some unobserved) which influence decisions about partnership transitions **and** childbearing
- If ignored, effects of interest will be biased

# Multiprocess Model of Partnership Transitions and Fertility



# Model for Partnership Transitions: Marital Separation

$$\text{logit}\, h^{PM}(t) = \alpha_0^M D^{PM}(t) + \alpha_1^M F(t) + \alpha_2^M X^{PM}(t) + u^{PM}$$

$h^{PM}(t)$ Hazard of marital separation

$D^{PM}(t)$ Partnership duration

$F(t)$ Prior fertility outcomes

$X^{PM}(t)$ Covariates affecting marital separation

$u^{PM}$ Woman-specific random effect ~ Normal

# Model for Partnership Transitions:
## Cohabitation to Separation (r=1) or Marriage (r=2)

**Multilevel discrete-time competing risks model:**

$$\log\left[\frac{h^{PC(r)}(t)}{h^{PC(0)}(t)}\right] = \alpha_0^{C(r)} D^{PC(r)}(t) + \alpha_1^{C(r)} F(t) + \alpha_2^{C(r)} X^{PC(r)}(t) + u^{PC(r)}$$

$h^{PC(0)}(t)$ is hazard of "no transition", i.e. stay cohabiting

Estimate jointly with model for marital separation

# Model for Fertility

## Marriage

$$\text{logit}\, h^{FM}(t) = \beta_0^M D^{FM}(t) + \beta_1^M F(t) + \beta_2^M X^{FM}(t) + u^{FM}$$

## Cohabitation

$$\text{logit}\, h^{FC}(t) = \beta_0^C D^{FC}(t) + \beta_1^C F(t) + \beta_2^C X^{FC}(t) + u^{FC}$$

# Data

- 1958 British birth cohort (National Child Development Study)
  - Partnership (living together for >1 month) and birth histories collected retrospectively at ages 33 and 42. Linked to form history for age 16-42.
  - Covariates from childhood and adulthood.

- Analysis sample: n=5142 women with ≥1 partner by age 42; n=7032 partnerships and n=9137 “partnership episodes”

# Selected Random Effect (Residual) Correlations Across Processes

- Separation from marriage and marital conception

  **r = -0.28*** (*sig. at 5% level)

- Separation from cohabitation and cohabiting conception

  **r = 0.19**

- Cohabitation to marriage and cohabiting conception

  **r = 0.59***

# Effects of Fertility Variables on Log-odds of Marital Separation

| Age/Father[a] | Single Process | Multiprocess |
|---|---|---|
| Preschool/Curr[b] | | |
| 1 | -0.52* | -0.51* |
| 2+ | -0.87* | -0.84* |
| Older/Curr | | |
| 1 | -0.21* | -0.22* |
| 2+ | -0.53 | -0.51* |
| Preschool/Prev | 0.24 | 0.26 |
| Older/Prev | 0.20 | 0.24 |
| Non-coresid | 0.91* | 0.91* |
| Corr($u^{PM}$,$u^{FM}$) | - | -0.28* |

*95% interval estimate does not contain zero
[a]Father is current or previous partner.
[b]Reference category for all vars is 0 children.

# Effects of Fertility Variables on Log-odds of Marrying vs. Staying Cohabiting

| Age/Father[a] | Single Process | Multiprocess |
|---|---|---|
| Preschool/Curr[b] | | |
| 1 | **-0.15** | **-0.23*** |
| 2+ | **-0.07** | **-0.25** |
| Older/Curr | | |
| 1 | **-0.36** | **-0.41*** |
| 2+ | **-0.32** | **-0.50** |
| Preschool/Prev | -0.03 | -0.04 |
| Older/Prev | -0.04 | -0.05 |
| Non-coresid | -0.39* | -0.42* |
| Corr($u^{PC(2)}$,$u^{FC}$) | - | 0.59* |

*95% interval estimate does not contain zero
[a]Father is current or previous partner.
[b]Reference category for all vars is 0 children.

# Conclusions

- Allowing for endogeneity of children conceived within marriage/cohabitation affects substantive conclusions regarding effects of children on move from cohabitation to marriage, but not on partnership dissolution

- Multiprocess approach also allows:
  - Estimation of correlation between unobservables within and across processes
  - Comparison of effects of covariates within and across processes