CHILD CARE FROM 0 TO 3 YEARS AND LATER CHILD BEHAVIOUR

The EDEN mother-child cohort

R Gomajee, F El Khoury, J. van der Waerden, L. Pryor, M. Melchior

Social Epidemiology Research Team, Pierre Louis Institute of Epidemiology and Public Hearth
UMRS_1136 INSERM-UPMC Sorbonne Universities
INTRODUCTION

- Importance of the **early years of life** regarding children’s psychological development—toxic stress but also protective factors (Shonkoff & Richmond, 2009)

- **Out-of-home childcare** in the early years of life (Ward et al. 2015, Lehto et al. 2016) as a protective factor?

- Links between **childcare and behaviour** debated (Baydar and Brooks-Gunn, 1991; Belsky and Rovine, 1988; Barnes et al., 2010; Beijsterveldt et al., 2005; Gialamas et al., 2014)

  - Influence of **family characteristics** (social situation, mental health)?
  - Role of childcare **quality**? **Duration** of exposure?

- **France**: an interesting context

  - Children in **preschool from age 3 years**
  - Access to **out-of-home care: subsidized** yet heterogeneous
Children’s out-of-home care ages 0-3 years in France (2012, %)

All children

- Parents: 63
- Family: 18
- Childminder: 10
- At home nanny: 4
- Center-based care: 2
- Other: 2

Children of parents who work full-time

- Parents: 27
- Family: 9
- Childminder: 27
- At home nanny: 18
- Center-based care: 4
- Other: 5

S. Villaume, E. Legendre Mode of care and welcome of young children in 2013. (DREES)
Research questions

- What is the **effect of childcare from 0 to 3 years** on children’s psychological development?

- Does the effect vary according to:
  - the **type of symptoms** studied?
  - the **duration of exposure**?
  - child (sex) and **family characteristics** (maternal depression and income)?
The EDEN mother-child cohort study

- 2002 women
- Nancy and Poitiers
- < 24 weeks of amenorrhea
- Recruited between 2003 and 2006

1907 mother-child pairs followed
- Miscarriage/Dead in-utero
- Abortions
- Attrition
- Missing data on the SDQ
- Missing data on childcare

1432 with at least a score SDQ
1428 with childcare and SDQ

Numbre of places in formal childcare/100 children in 2011
Exposure and Outcome

3 groups of childcare:
- **Informal** (parents +++, grand parents, babysitter, neighbors, friends…) : 29.8% (n=425)
- **Childminder** : 44.5% (n=636)
- **Center-based** (creche, nursery, daycare center…): 25.7% (n=367)

Strengths and Difficulties Questionnaire (SDQ)

- Screening of emotional and behavioral difficulties in children and adolescents.
- Validated in several languages including French\(^1\)
- 5 scales of 5 items each
- Questionnaire completed by the mother at 3.5, 5.5 and 8 years.

Covariables

Centre
Maternal characteristics (age, history of psychiatric disorders, psychological assistance, pre and postnatal depression)
Parental characteristics (tobacco, alcohol and cannabis consumption, education levels)

Family characteristics: (Family situation, employment status, financial difficulties)

Characteristics of the child (Gender, birth weight, prematurity, siblings)

Duration of breastfeeding
Age of school entry

Pregnancy
Birth
Early childhood and childhood

< 24 SA
24-28 SA

4 months
8 months
1 year
2 years
3,5 years
5,5 years
8 years

Parent-child activities

Parent-child activities

Modes of care

EPDS: Edinburg Post-natal Depression Scale
CESD: Center for Epidemiologic Studies – Depression scale
**Behavioural Trajectories**

- Modeling trajectories based on probabilistic grouping using PROC TRAJ under SAS\(^1\)
- Model with 3 distinct behavioral trajectories
- Each trajectory = level of symptoms over time

Trajectories of SDQ scores in the EDEN cohort (n = 1428)

Missing data

- Average rate: 6.4%.
- < 20% for all variables except the 1-year EPDS score

Multiple imputations

- Each missing value -> 10 plausible values representing the uncertainty of the true value.
  - Multiple imputation by Fully Conditional Specification (MI).
  - Analyses of the imputed database with standard methods (logistic regression).
Propensity scores et Inverse Probability Weights (IPWs)

- Several selection factors and confounding variables - choice of childcare: availability, family and child characteristics.

- Measurement of the specific effect of childcare on behavioral trajectories.

- Probability of being in a particular childcare group conditional on baseline characteristics (propensity score).¹

- Balancing score: conditional on the propensity score, the distribution of the measured covariates is similar between the 3 childcare groups.¹

- Pseudo population: the distribution of the measured covariates is independent of childcare.

- Multinomial logistic regression after weighting on inverse probability weights.

SPC: Socio-Professional Category
1. Austin PC: Multivariate Behav Res. 2011 May
Geographic and individual characteristics and EDEN children’s childcare from 0 to 3 years.

### Centre (%)

<table>
<thead>
<tr>
<th></th>
<th>Childminder</th>
<th>Center-based</th>
<th>Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nancy</td>
<td>43.1%</td>
<td>56.9%</td>
<td>55%</td>
</tr>
<tr>
<td>Poitiers</td>
<td>55%</td>
<td>45%</td>
<td>49.2%</td>
</tr>
<tr>
<td></td>
<td>48.2%</td>
<td>50.8%</td>
<td>52.5%</td>
</tr>
</tbody>
</table>

### Gender (%)

<table>
<thead>
<tr>
<th></th>
<th>Childminder</th>
<th>Center-based</th>
<th>Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boy</td>
<td>52.7%</td>
<td>48.2%</td>
<td>52.5%</td>
</tr>
<tr>
<td>Girl</td>
<td>47.3%</td>
<td>51.8%</td>
<td>47.5%</td>
</tr>
</tbody>
</table>

Nancy Poitiers
Maternal characteristics and EDEN children’s childcare from 0 to 3 years (2)

% >=higher education

% employed

<table>
<thead>
<tr>
<th></th>
<th>Pregnancy</th>
<th>4 months</th>
<th>8 months</th>
<th>12 months</th>
<th>24 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childminder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>92.1</td>
<td>59.3</td>
<td>87</td>
<td>93.9</td>
<td>95.6</td>
</tr>
<tr>
<td>Mother</td>
<td>88.6</td>
<td>58.5</td>
<td>77.9</td>
<td>88.3</td>
<td>92.4</td>
</tr>
<tr>
<td>Center-based</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>48.2</td>
<td>11.3</td>
<td>14.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
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</tbody>
</table>

Child minder | Center-based | Informal

Father | Mother

<p>| | | | | |</p>
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<tr>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Father</td>
<td>50.6</td>
<td>51.9</td>
<td>35.8</td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>66.2</td>
<td>69.8</td>
<td>38.4</td>
<td></td>
</tr>
</tbody>
</table>
Childcare from 0 to 3 ans and total SDQ score between 3 and 8 years (%)

<table>
<thead>
<tr>
<th>AGE</th>
<th>Childminder</th>
<th>Center-based</th>
<th>Informal</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 YEARS</td>
<td>10.0</td>
<td>8.9</td>
<td>10.8</td>
</tr>
<tr>
<td>5.5 YEARS</td>
<td>9.0</td>
<td>7.8</td>
<td>9.3</td>
</tr>
<tr>
<td>8 YEARS</td>
<td>8.9</td>
<td>7.7</td>
<td>9.0</td>
</tr>
</tbody>
</table>
Childcare from 0 to 3 years and overall behavior trajectory from 3 to 8 years (bivariate and IPW-adjusted multinomial regressions, OR)

BIVARIATE ORs
- INFORMAL (N = 425, 29.8%)
  - Childminder (N = 636, 45.6%)
  - Intermediate group
  - High group

IPW-ADJUSTED ORs
- INFORMAL (N = 425, 29.8%)
  - Childminder (N = 636, 45.6%)
  - Intermediate group
  - High group

Intermediate group
High group
BEHAVIOUR SCALE TRAJECTORIES

- **High trajectory (N = 221, 15.5%)**
- **Intermediate trajectory (N = 881, 61.7%)**
- **Low trajectory, ref (N = 297, 22.8%)**
HYPERACTIVITY SCALE TRAJECTORIES

- **High trajectory** (N = 216, 15.1%)
- **Intermediate trajectory** (N = 810, 56.7%)
- **Low trajectory, ref** (N = 402, 28.2%)
EMOTIONAL SCALE TRAJECTORIES

SDQ SCORE

AGE (YEARS)

High trajectory (N = 228, 16,0%)

Intermediate trajectory (N = 1010, 70,7%)

Low trajectory, ref (N = 190, 13,3%)
PEER PROBLEMS SCALE TRAJECTORIES

High trajectory
(N = 97, 6.8%)

Intermediate trajectory
(N = 1078, 75.5%)

Low trajectory, ref
(N = 253, 17.7%)
PROSOCIAL BEHAVIOUR SCALE TRAJECTORIES

High trajectory, ref (N = 318, 22.3%)
Intermediate trajectory (N = 923, 64.6%)
Low trajectory (N = 187, 13.1%)
Childcare from 0 to 3 ans and **externalizing difficulties** from 3 to 8 years

(IPW-adjusted multinomial regression, OR)

<table>
<thead>
<tr>
<th>Hyperactivity / inattention</th>
<th>OR ajusté sur l'IPW</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMAL</td>
<td>0.86</td>
</tr>
<tr>
<td>CHILDMINDER : INT</td>
<td>0.98</td>
</tr>
<tr>
<td>CHILDMINDER: HIGH</td>
<td>0.75</td>
</tr>
<tr>
<td>CENTER-BASED : INT</td>
<td>0.54</td>
</tr>
<tr>
<td>CENTER-BASED : HIGH</td>
<td>0.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conduct disorder</th>
<th>OR ajusté sur l'IPW</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMAL</td>
<td>0.75</td>
</tr>
<tr>
<td>CHILDMINDER : INT</td>
<td>0.71</td>
</tr>
<tr>
<td>CHILDMINDER : HIGH</td>
<td>0.71</td>
</tr>
<tr>
<td>CENTER-BASED : INT</td>
<td>0.67</td>
</tr>
<tr>
<td>CENTER-BASED : HIGH</td>
<td>0.67</td>
</tr>
</tbody>
</table>
Childcare from 0 to 3 ans and **internalizing difficulties** from 3 to 8 years (IPW-adjusted multinomial regression, OR)
Childcare from 0 to 3 ans and **prosocial behaviour** from 3 to 8 years (IPW-adjusted multinomial regression, OR)

- **INFORMAL**
  - Childminder: INT
    - Odds Ratio (OR): 0.71, 1.16, 1.89
  - Childminder: LOW
    - OR: 0.58, 0.88, 1.32
- **CENTER-BASED**
  - Int
    - OR: 0.50, 0.81, 1.30
  - Low
    - OR: 0.47, 0.66, 0.94
Sub-group analyses

- Effect associated with **duration** in childcare (<vs,> = 1 year):
  High SDQ symptoms and center-based care:
  <1 year: OR: 0.67
  >= 1 year: OR: 0.42.
- **Girls ++** (childminder, but especially center-based care).
- Children whose **mother is not depressed**, and whose family has **no financial problems**.
DISCUSSION (1)

Main results
- **Childcare** -> decrease in the likelihood of psychological difficulties in children (especially *emotional difficulties* and *prosocial behavior*).
- **Center-based** > Childminder
- **Duration** ++
- **Girls** +++, non-disadvantaged children

Limits and mains strengths
- Non representative *sample*, although varied
- SDQ *declared* by mothers
- Longitudinal follow-up of the child's mental health since birth
- Comparison of *two types of childcare*
- Propensity score> multivariate logistic analysis: > 30 selection and confounding factors
French context:

- **High quality** of collective mode of care (UNICEF, 2008)
- **Schooling** at 3 years

Potential Mechanisms
- Cognitive stimulation.
- Socialization and learning of common rules in contact with other children.
- Early acquisition of emotional regulation
- Improved self-esteem by learning new things.
- Universal offer insufficient for children from families in difficulty?

Research perspectives:
Evaluation of the effects of childcare:
- on long term behaviour
- on cognitive and language development
- in EDEN and ELFE (n=18 000 children born in 2011)
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RESULTS (6)

Time spent in care and trajectories of behavioral disorders after adjustment on IPW and multinomial logistic regression. (Reference = lower trajectory)

<table>
<thead>
<tr>
<th>Time spent in care</th>
<th>Maternal assistant:</th>
<th>Communal:</th>
<th>Informal:</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>12.2%, N = 174</td>
<td>11.7%, N = 167</td>
<td>29.8%, N = 425</td>
</tr>
<tr>
<td>&gt; 1 year</td>
<td>32.4%, N = 462</td>
<td>14.0%, N = 200</td>
<td></td>
</tr>
</tbody>
</table>
RESULTS (8)
Comparaison of collective mode of care to the maternal assistant
Odds ratios of being in a high trajectory (intermediate and high trajectories combined)
RESULTS (10)
Comparaison of collective mode of care to the maternal assistant
Odds ratios of being in a high trajectory (intermediate and high trajectories combined)

- No depression
- Depression

Maternal ass. :-) (N = 526)
Maternal ass. :-( (N = 110)
Communal :-} (N = 303)
Communal :-( (N = 64)
RESULTS (9)

Comparaison of collective mode of care to the maternal assistant

Odds ratios of being in a high trajectory (intermediate and high trajectories combined)

Education levels and mode of care

- Maternal ass. >BAC + 2 ans (N = 421)
- Maternal ass. <BAC + 2 ans (N = 215)
- Communal >BAC >BAC + 2 ans (N = 256)
- Communal <BAC + 2 ans (N = 111)

< BAC + 2 years

>= BAC + 2 years
RESULTS (11)

Comparison of collective mode of care to the maternal assistant

Odds ratios of being in a high trajectory (intermediate and high trajectories combined)

- Income > 1500 E
- Income < 1500 E

Financial problems and mode of care

Odds Ratios

Income < 1500 E at least one time

- Maternal ass. $$$ (N = 589)
- Maternal ass. $ (N = 47)
- Communal $$$ (N = 322)
- Communal $ (N = 45)