Language development of three to twelve-year-old twins compared to singletons

Evelien D’haeseleer, Eline Geenens, Sarah Parmentier, Kristiane Van Lierde

No disclosures

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Introduction

- Language development in twins tend to lag behind

<table>
<thead>
<tr>
<th>Authors</th>
<th>subjects</th>
<th>Language aspects</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day, 1932</td>
<td>80 twins Age range: 2-5 y</td>
<td>Expressive vocabulary and syntax</td>
<td>Twins scored weak for expressive vocabulary and syntax. Twins produced their first words at a mean age of 25 months.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production of the first words</td>
<td></td>
</tr>
<tr>
<td>Davis, 1937</td>
<td>436 twins and singletons Age range: 5;6y-9;6y.</td>
<td>Articulation, expressive vocabulary and syntax.</td>
<td>Twins scored lower for articulation and expressive vocabulary. No differences between twins and singletons for syntax.</td>
</tr>
<tr>
<td>Authors</td>
<td>subjects</td>
<td>Language aspects</td>
<td>Results</td>
</tr>
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</tr>
<tr>
<td>Rutter et al., 2003</td>
<td>96 twins, 98 singletons Age: at 20 months and 3y</td>
<td>Receptive and Expressive language skills using The McArthur Communicative Development Inventory (at 20 months) and the Pre-School Language Scales and McCarthy Scales of Children’s Abilities (at 36 months)</td>
<td>Language delay in twins of 1.7 months at the age of 20 months 3.1 months at the age of 3 years.</td>
</tr>
<tr>
<td>Gucuyener et al., 2011</td>
<td>162 twins, 124 singletons Age: 5y</td>
<td>Expressive vocabulary using the Peabody Picture Vocabulary Test</td>
<td>Even after excluding premature twins, twins performed worse than singletons and twin girls performed better than twin boys. Preterm twins performed worse than term twins.</td>
</tr>
<tr>
<td>Rice et al., 2013</td>
<td>473 twins pairs Age: 24 months</td>
<td>Vocabulary and grammar using the Mac Arthur Communicative Development Inventories: words and sentences</td>
<td>Twins had lower average scores than norms for singletons. Monozygotic twins and boys had lower scores than dizygotic twins and girls.</td>
</tr>
</tbody>
</table>

**Shortcomings in the literature**

- Mostly based on older studies
- Especially young children
- Parental questionnaires
- Psychological, cognitive test batteries
  - Not appropriate
  - Standardized language batteries are more suitable

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Purpose

To compare expressive and receptive language skills of three to twelve-year-old twins with matched singletons using a standardized language battery, the CELF-4-NL.

To investigate the language differences between singletons and twins with a normal gestational age at birth by excluding preterm born children.

To investigate whether the language differences between twins and singletons change with increasing age.

**Methods - subjects**

**TWINS**
- n = 23
- 14 ♀, 9 ♂
- Mean age: 5y1m (3;10-11;4)

Inclusion criteria
- Member of a twin
- Normal cognitive development
- Normal education
- Absence of neurological abnormality
- Between 3 and 12 years

**SINGLETONS**
- n = 23
- 14 ♀, 9 ♂
- Mean age: 5y1m (3;9-11;4)

Inclusion criteria
- Singletons matched for age (+/- 3 months) and gender
- Normal cognitive development
- Normal education
- Absence of neurological abnormality
- Between 3 and 12 years

Excluded:
- 1 twin girl and corresponding match for cognitive impairment

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Methods – language assessment

- **Clinical Evaluation of Language Fundamentals (CELF-4-NL)**
  - For children > 6 years
    - Core Language Index (CLI)
    - Receptive Language Index (RLI)
    - Expressive Language Index (ELI)

- **CELF Preschool-II-NL**
  - For children ≤ 6 years
    - Core Language Index (CLI)
    - Receptive Language Index (RLI)
    - Expressive Language Index (ELI)

- **Parental questionnaire**
  - Neonatal and socio demographic data

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Methods – statistical analysis

- Data \(\rightarrow\) percentile ranks

- Comparison data twins and singletons
  - Wilcoxon matched-pairs signed-ranks test

- Comparison data term twins and singletons
  - Exclusion of all preterm born children
  - Wilcoxon matched-pairs signed-ranks test

- Correlation between age and language difference between each pair of twins and singletons
  - Spearman correlation

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### Results

**Neonatal and socio demographic data**

- **Socio-economic status**
  - Maternal education level
  - Chi square test: $p=0.064$

<table>
<thead>
<tr>
<th>Education level</th>
<th>Twins n (%)</th>
<th>Singletons n (%)</th>
<th>Total group n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary school</td>
<td>7 (15.2%)</td>
<td>1 (2.2%)</td>
<td>8 (17.4%)</td>
</tr>
<tr>
<td>Tertiary education (College)</td>
<td>10 (21.7%)</td>
<td>13 (28.2%)</td>
<td>23 (50%)</td>
</tr>
<tr>
<td>Tertiary education (University)</td>
<td>6 (13.0%)</td>
<td>9 (19.6%)</td>
<td>15 (32.6%)</td>
</tr>
</tbody>
</table>

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### Results

- **Neonatal characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Twins</th>
<th>Singletons</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean gestational age at birth (weeks)</td>
<td>Mean 35.0, SD 3.6, Min 27.0, Max 38.0</td>
<td>Mean 38.4, SD 1.1, Min 37.0, Max 41.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Birth weight (g)</td>
<td>Mean 2519.4, SD 472.9, Min 1700.0, Max 3400</td>
<td>Mean 3540.0, SD 375.2, Min 2860, Max 4260.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Birth length (cm)</td>
<td>Mean 47.5, SD 3.0, Min 40.0, Max 52</td>
<td>Mean 50.6, SD 2.0, Min 46.0, Max 57.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Age mother at birth (y)</td>
<td>Mean 31.0, SD 3.0, Min 27.0, Max 36</td>
<td>Mean 29.8, SD 4.0, Min 24.0, Max 40.0</td>
<td>0.097</td>
</tr>
</tbody>
</table>

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## Results

### Comparison twins and singletons

<table>
<thead>
<tr>
<th>Language indexes</th>
<th>Twins</th>
<th></th>
<th>Singletons</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>CLI</td>
<td>23</td>
<td>38.11</td>
<td>27.35</td>
<td>4.8</td>
<td>88.5</td>
</tr>
<tr>
<td>RLI</td>
<td>23</td>
<td>44.21</td>
<td>29.15</td>
<td>5.5</td>
<td>95.8</td>
</tr>
<tr>
<td>ELI</td>
<td>23</td>
<td>33.02</td>
<td>24.56</td>
<td>1.0</td>
<td>74.8</td>
</tr>
</tbody>
</table>

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## Results

### Comparison term twins - singletons

<table>
<thead>
<tr>
<th>Language indexes</th>
<th>Twins</th>
<th></th>
<th>Singletons</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>CLI</td>
<td>10</td>
<td>38.00</td>
<td>27.45</td>
<td>4.8</td>
<td>88.5</td>
</tr>
<tr>
<td>RLI</td>
<td>10</td>
<td>40.82</td>
<td>32.01</td>
<td>5.5</td>
<td>88.5</td>
</tr>
<tr>
<td>ELI</td>
<td>10</td>
<td>31.22</td>
<td>19.73</td>
<td>6.3</td>
<td>60.5</td>
</tr>
</tbody>
</table>

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Results

- **Correlation age – language difference singletons/twins**

<table>
<thead>
<tr>
<th>language indexes</th>
<th>Correlation coefficient</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLI</td>
<td>0.290</td>
<td>0.179</td>
</tr>
<tr>
<td>RLI</td>
<td>0.259</td>
<td>0.233</td>
</tr>
<tr>
<td>ELI</td>
<td>0.122</td>
<td>0.580</td>
</tr>
</tbody>
</table>

Discussion

- **Twins score sign. lower than singletons for expressive and receptive language skills**
  - Mean difference: pc 19.1
  - Mean scores correspond with normal language skills in both groups
  - Language delay is mild!
  - Lower for all language aspects: semantics, morphology, syntax
  - No information about pragmatic skills!
  - Rutter et al. (2003), Gucuyener et al., 2011; Rice et al. (2014)
Discussion

- **Possible causes?**
  - **No socio-economic differences**
    - No differences in maternal education level between both groups
  - **Preterm birth**
    - Language delay even between term twins and singletons
    - Difference is not significant for the CLI and the RLI
    - Small sample size
    → Preterm birth cannot be (the only) cause of language delay in twins

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Discussion

- **Possible causes?**
  - **Differences in postnatal experiences?**
    - Different patterns in family interaction
    - Parents need to divide their attention
    - Less one-to-one interactions
    - Additional stresses (Rutter et al., 2003)
    - Parentese
      - Less and less complex (Conway et al., 1980)
      - More directed at both twins
    - Language between siblings
      - more interactions with the same developmental level (Rutter et al., 2003)

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- **Cryptophasia ('private language'):**

  - Phenomenon of an autonomous language developed by twins that only the children understand.
  
  - Developmental phenomenon occurring in both twins and singletons
  
  - Prevalence is higher in twins *(Thorpe et al. 2001)*
  
  - More an early indication than a cause

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**Discussion**

- **Temporary phenomenon??**

  - Literature: not clear, rather a temporary delay,
  
  - No correlation between age and the difference in language skills between twins and singletons
  
  - Language delay does not seem to decrease over time
  
  - Further research in older twins and singletons!

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Limitations

- Small sample size

- Absence of IQ data

- Number of siblings should be taken into account

- Pragmatic skills and spontaneous language should be further investigated.

Reference