**Title:** How Does Prematurity and Early Intervention Relate to Developmental Outcomes in Infants with Down Syndrome?

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**Introduction:** Research indicates that infants born prematurely who participate in early intervention therapy have higher levels of cognitive functioning than those who do not (McManus, et al., 2011). However, only 40% of premature infants receive early intervention despite federal support (Part C initiative; Greene & Patra, 2016). In Down syndrome (DS), there is a paucity of research examining the relationship between prematurity, early intervention, and developmental outcomes. In infants with DS, prematurity has been associated with impoverished attention (Fidler et al., 2018), establishing a background to further investigate outcomes associated with this comorbid risk factor. This preliminary project sought to characterize how prematurity and early intervention is related to developmental outcomes in infants with DS.

**Method:** Infants with DS who were part of a larger study participated in this secondary data analysis. We equated groups with chronological age (CA). At Time 1 (T1) caregivers reported information about their premature (DS-P; n = 17; CA \( M = 7.91, SD = 2.59 \)) or full-term (DS; n = 19; CA \( M = 7.74, SD = 2.88 \), see Table 1 for participant characteristics) infants, including weeks premature, as well as information regarding the number and hours per week of early intervention therapies (i.e., occupational therapy, speech therapy, and physical therapy). Additionally, infants (n=36) participated in the Bayley Scales of Infant Development 3rd edition (BSID-III; Bayley, 2006) at T1 and again six months later (T2) to assess developmental age (DA; derived from averaging the BSID developmental age scores in the cognitive, receptive communication, expressive communication, fine motor, and gross motor domains).

**Results:** At T1 this sample participated in an average of 1.61 hours of therapies each week (SD= .90; DS-P group: n = 7 speech therapy, n = 11 occupational therapy, n = 12 physical therapy, and n=2 no therapies; DS group: n = 5 speech therapy, n = 12 occupational therapy, n = 11 physical therapy, and n=1 no therapies). Also, at T1, the DS-P group on average spent less time in therapies (hours/week), but the difference was not significant (DS-P \( M = 1.35, SD = 1.02 \); DS \( M = 1.70, SD = 1.27 \), \( t (34) = .89, p = .38, d=.31 \)).

Similarly, at T1, the DS-P group mean DA (DA \( M = 4.54, SD = 1.43 \)) was lower than the DS group (M = 5.53, SD = 2.79), but this difference was not statistically significant (t (34) = 1.31, p = .20, d=.44). At T2, DS-P DA (M = 8.56, SD = 1.49) was also lower than the DS group (M = 9.99, SD = 2.97) and this difference approached significance (t (34) = 1.79, p = .08, d=.61). Additionally, there was a moderate, negative association between T1 number of weeks premature and T2 DA using a Spearman’s correlation (\( r_s (33) = -.31, p = .08 \)) indicating that greater amounts of prematurity were associated with less competent developmental ages. While this effect was moderate, it only approached significance. There was no meaningful correlation between the amount of time spent in therapies, as reported by caregivers, and T2 DA (\( r_s (33) = -.15, p = .37 \)).

**Discussion:** The current preliminary study is among the first to examine prematurity and the relationship between early intervention therapy and neurodevelopmental outcomes in infants with DS. The preliminary data suggest that prematurity is a risk factor for less competent developmental outcomes in this population. The results indicated that the DS-P group had a lower DA with a moderate effect size at T2, but this finding only approached significance. Notably, the DS-P and DS groups engaged in similar amounts of therapy (hours/week), despite one group having an additional comorbid risk factor. Hours per week spent in therapies at T1 were not associated with better DA outcomes at T2 which diverges from research on infants with prematurity and no DS (McManus et al., 2011). However, there was a moderate, negative association with more prematurity being associated with less competent developmental ages. Taken as a whole, these findings highlight a critical need to better understand comorbid prematurity and the role of Part C early intervention therapies in optimizing outcomes for infants with DS. The generalizability of these findings is limited by the modest sample size and the use of informant-report. Future studies should replicate these findings with a larger sample and also evaluate whether prematurity, in contrast to other comorbidities such as congenital heart defects, predisposes infants to specific developmental weaknesses or whether it is an additive risk.
References/Citations:


Table 1

**Participant characteristics by group**

<table>
<thead>
<tr>
<th>Variables of Interest</th>
<th>Down syndrome – Premature (DS-P) (n = 17; 64.7% male)</th>
<th>Down syndrome – Full-term (DS) (n =19; 47.4 %male)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Chronological age at T1</td>
<td>7.91 (2.59)</td>
<td>7.74 (2.88)</td>
</tr>
<tr>
<td>Prematurity (weeks)</td>
<td>4.79 (2.84)</td>
<td>NA</td>
</tr>
<tr>
<td>DA at T1</td>
<td>4.54 (1.43)</td>
<td>5.53 (2.79)</td>
</tr>
<tr>
<td>DA at T2</td>
<td>8.56 (1.49)</td>
<td>9.99 (2.97)</td>
</tr>
<tr>
<td>Therapy hours/week</td>
<td>1.35 (1.02)</td>
<td>1.70 (1.27)</td>
</tr>
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