



Risk Factors for Cerebral Palsy, Mental Retardation, Hearing Loss and Vision Impairment Among 3-10 Year Old Twins in Metropolitan Atlanta

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**National Center on Birth Defects
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Background

- Prevalence of multiple births has increased over the past two decades
- Children of a multiple births have been shown to have higher rates of cerebral palsy
- Limited research on other developmental disabilities



Objective

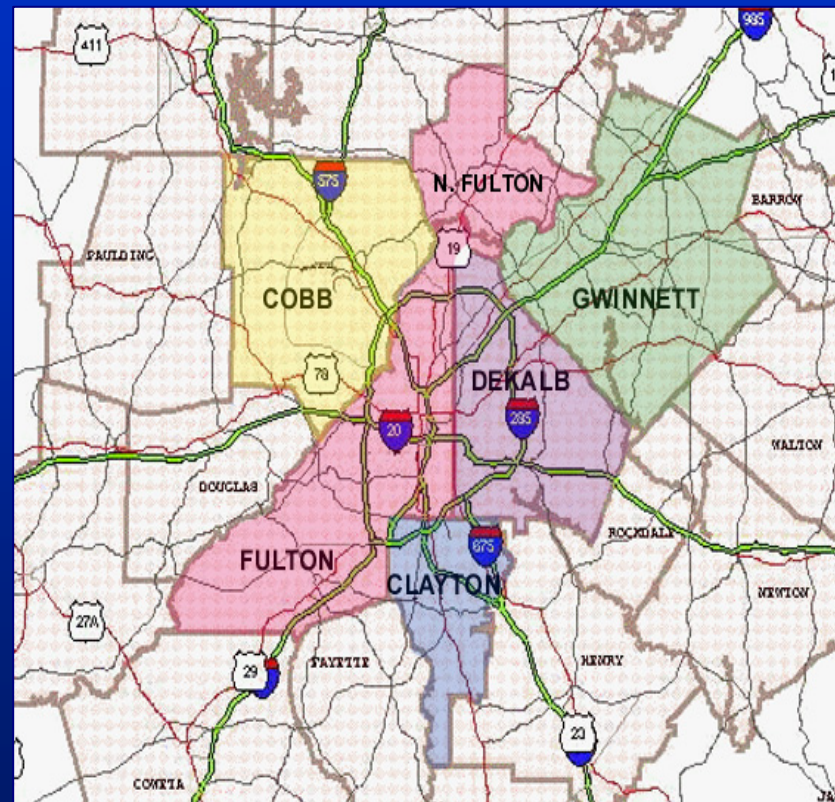
- To examine the risk factors for four developmental disabilities (CP, MR, HL, VI) among 3-10 year old twins in Metropolitan Atlanta



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Metropolitan Atlanta Developmental Disabilities Surveillance Program (MADDSP)

- Ongoing, population-based, active monitoring program based on record review
- Mental retardation, cerebral palsy, vision impairment and hearing loss; autism spectrum disorders since 1996
- Children aged 3-10 years, 1991-1994; 8 year olds in future study years
- Multiple sources (educational, clinical, service)
- Five counties in metro Atlanta



MADDSP Surveillance Case Definitions

Mental Retardation (MR)

I.Q. \leq 70 on most recently administered psychometric test.

Cerebral Palsy (CP)

A diagnosis of CP made by a qualified health professional (or) a description of physical findings consistent with CP. Final case determination is made by the program's developmental pediatrician.

Hearing Loss (HL)

Measured bilateral pure tone hearing loss averaging 40 decibels or higher (unaided) in the better ear.

Vision Impairment (VI)

Measured visual acuity of 20/70 or worse in the better eye with correction.



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Methods

- MADDSP data linked to Georgia Birth Certificate Files.
- Study population included 3-10 year old twins and singletons with cerebral palsy, mental retardation, hearing loss and/or vision impairment identified by MADDSP during 1991-1994 surveillance years
- Prevalence of each developmental disability overall and by presence of co-existing impairment calculated using 95% Poisson confidence intervals
- Bivariate and logistic regression analyses used to examine demographic, pregnancy and birth risk factors.
 - Backward elimination used to build logistic regression model.



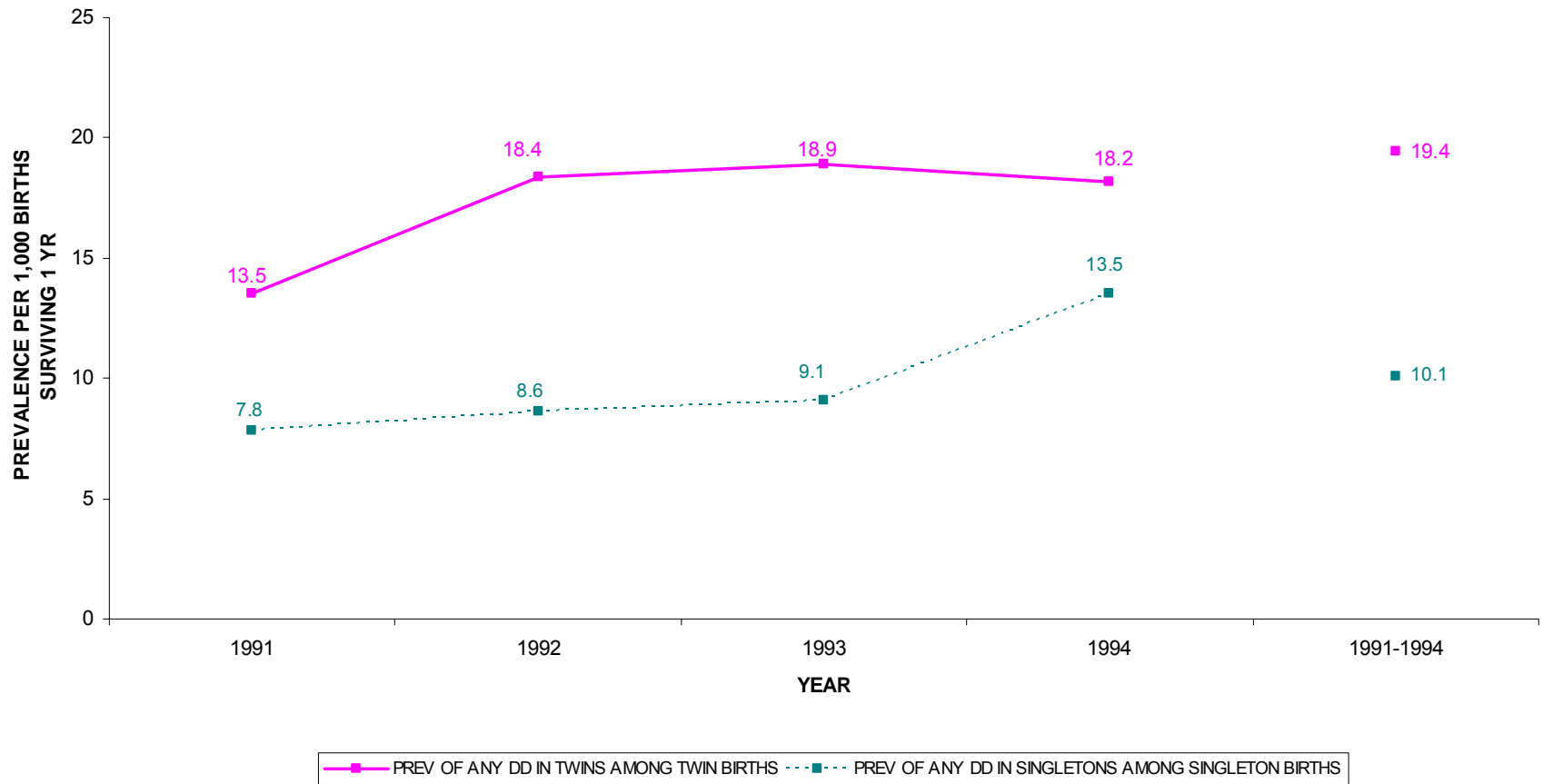
Results

Frequency of Singleton and Multiple Births by Developmental Disability among 3-10 Year Old Children in Metro Atlanta, 1991-1994

| | Cerebral Palsy | Mental Retardation | Hearing Impairment | Vision Impairment | Any DD |
|------------------------------|----------------|--------------------|--------------------|-------------------|--------------|
| <i>Single Birth</i> | | | | | |
| Singleton | 737 (92.6%) | 2877 (96.0%) | 275 (96.2%) | 257 (95.2%) | 3529 (95.8%) |
| | | | | | |
| <i>Multiple Birth</i> | | | | | |
| Twin | 56 (7.0%) | 117 (3.9%) | 9 (3.1%) | 11 (4.0%) | 149 (4.0%) |
| Triplet | 2 (0.3%) | 3 (0.1%) | 2 (0.7%) | 2 (0.7%) | 6 (0.2%) |
| ≥ 3 Multiple | 1 (0.1%) | 0 (0%) | 0 (0%) | 0 (0%) | 1 (0.03%) |

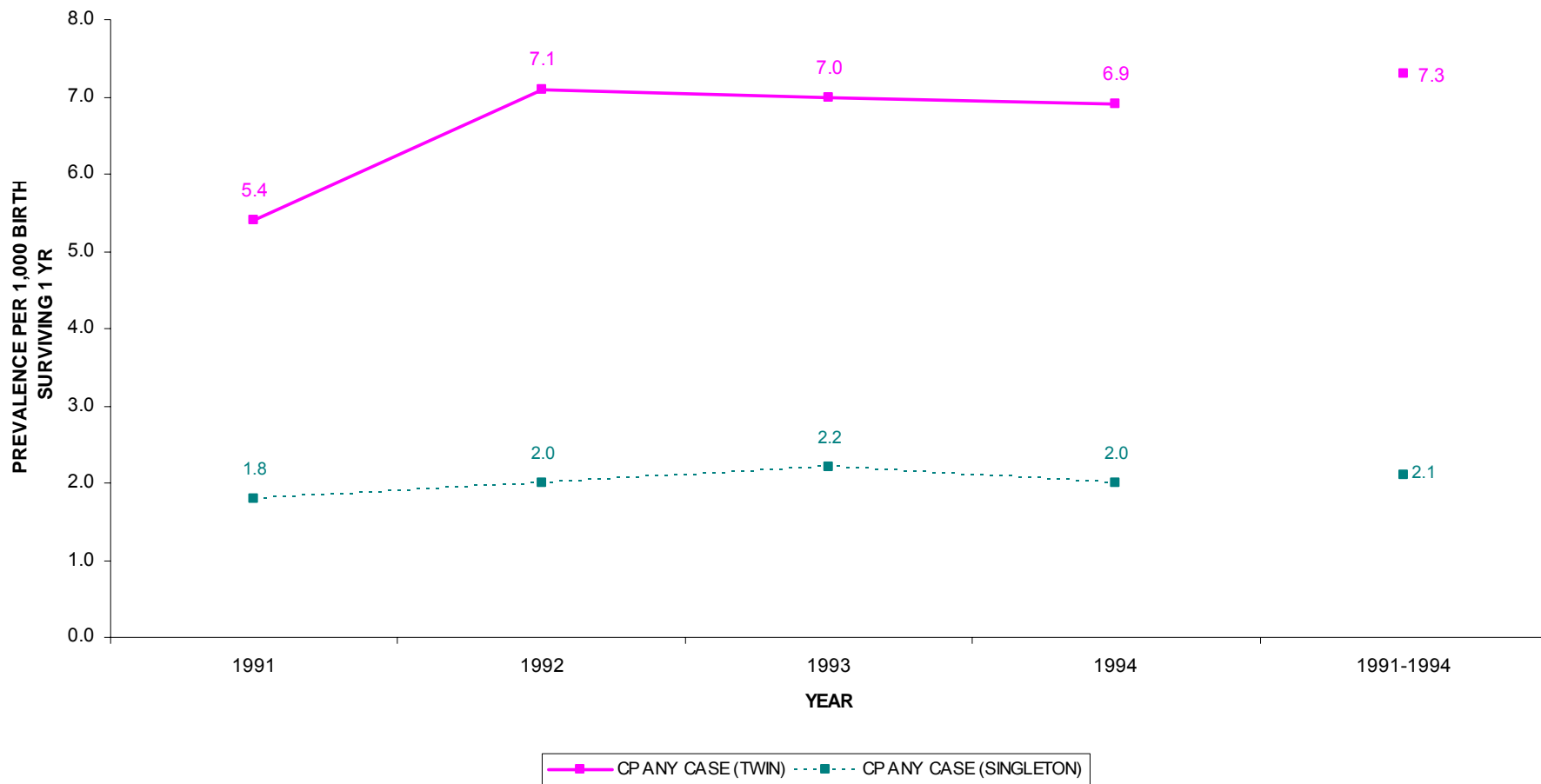
Results

PREVALENCE OF ANY DEVELOPMENTAL DISABILITY (CP, MR, HL, VI) AMONG 3-10 YR OLDS IN TWIN & SINGLETON BIRTHS



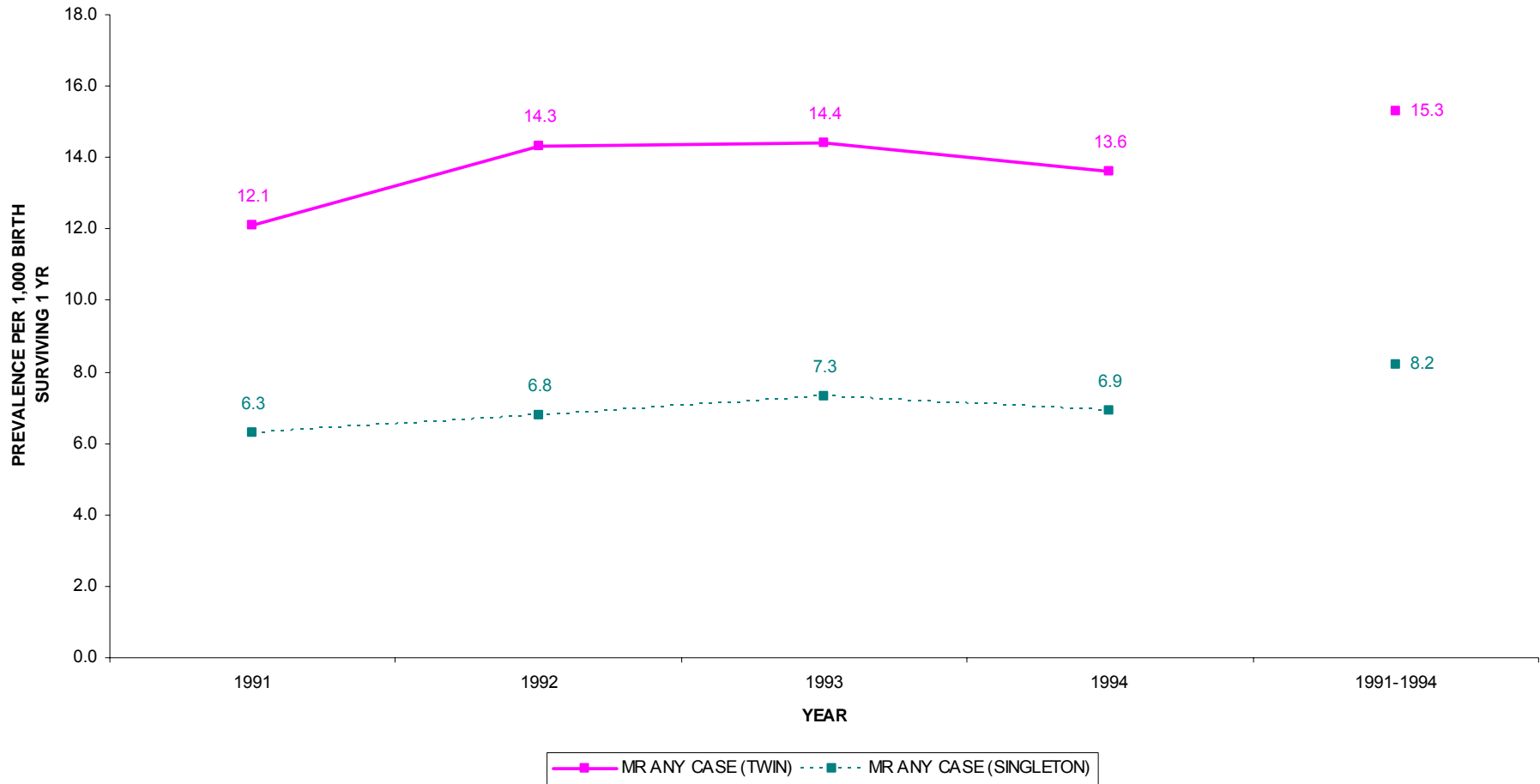
Results

PREVALENCE OF CEREBRAL PALSY AMONG 3-10 YR OLD TWINS & SINGLETONS



Results

PREVALENCE OF MENTAL RETARDATION IN 3-10 YR OLD TWINS & SINGLETONS



Results

Comparison of Singletons & Twins with Developmental Disabilities

- Twins with DD more likely to be:
 - Lower birth weight
 - Preterm
 - Small for gestational age
 - Of a first pregnancy
- Non-significant factors:
 - Gender, race, APGAR score, maternal and paternal age and education



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Results

Comparison of Twins with and without Developmental Disabilities

- Twins with DD more likely to:
 - Black
 - Lower birth weight
 - Preterm
 - Lower mean APGAR score
 - First pregnancy
 - Pregnancy Complication: anemia, no prenatal care, placenta previa
 - Maternal Characteristics: younger mean age, lower education levels, single

- Non-significant factors:
 - Gender, SGA, Diabetes, Eclampsia, Chord, Abrupto Placenta, Intrapartum Fever



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Logistic Regression Analysis for Odds of Developmental Disability by Risk Factor

| Risk Factors [‡] | AOR | 95% CI |
|---|-----|-----------|
| Demographic | | |
| Race | | |
| White | 1.0 | - |
| Black | 2.7 | 1.7, 4.0 |
| Other | 0.9 | 0.1, 6.7 |
| Birth Characteristics | | |
| Birth Weight | | |
| Normal Birth Weight (≥2500g) | 1.0 | |
| Low Birth Weight (1500-2499g) | 1.6 | 1.0, 2.6 |
| Very Low Birth Weight (1000-1499g) | 5.8 | 3.3, 10.2 |
| Extremely Low Birth Weight (<1000g) | 6.9 | 3.6, 13.8 |
| Maternal and Pregnancy Characteristics | | |
| Marital Status | | |
| Married | 1.0 | - |
| Single | 1.6 | 1.1, 2.4 |
| Maternal Education | | |
| Less than 12 years | 2.1 | 1.3, 12.8 |
| 12 Years | 1.0 | - |
| Greater than 12 years | 0.7 | 0.4, 1.1 |
| Placenta Previa | | |
| No | 1.0 | - |
| Yes | 4.0 | 1.3, 12.8 |
| Parity | | |
| Multipara | 1.0 | - |
| Primipara | 2.2 | 1.5, 3.3 |

AOR= Adjusted Odds Ratio

[‡] Each factor adjusted for gender, maternal age, APGAR score, prenatal care and other factors in table.



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Summary

- Twins had a higher prevalence of developmental disabilities compared to singletons.
- Among children with a developmental disability, twins were more likely to be LBW, preterm, SGA and of a first pregnancy than singletons.
- When controlling for other risk factors, twins with developmental disabilities had a higher odds of being black, LBW, of a single mother with less than 12 yr education, of a first pregnancy and after event of placenta previa than twins without a developmental disability



Strengths & Limitations

■ Strengths

- Used population based data over multiple years
- Examined DDs beyond CP

■ Limitations

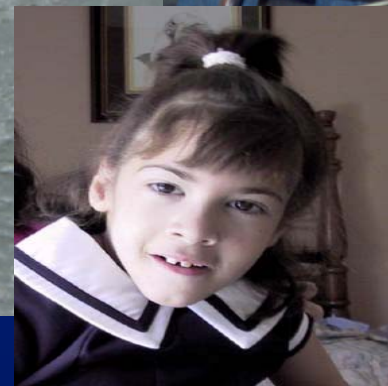
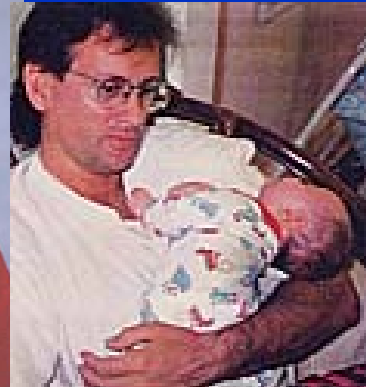
- Small number of twins with HL and VI
- Relied on accuracy of birth certificate data
 - ◆ Birth certificates changed in 1989 in the middle of birth years included in study so restricted in the number of consistent variables
 - ◆ Missing Data



Future Analyses

- **Further analysis to examine each developmental disability individually**
 - **Examine the impact of co-twin fetal death**
- **Further studies are in process to compare utilization of special education services among twins and singletons. This study will build on MADDSP results, increase sample size, expand age ranges and include more recent study years.**





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THANK YOU!



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