The Deirdre Imus Environmental Center for Pediatric Oncology®

St. Anthony's Project

Study Summary
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1 Description of Study

INTRODUCTION
June 2007: Concerns raised by teachers at St. Anthony's School
PVH town hall meeting with Dr. Rosen and DIEC staff
Dr. Rosen met with Superintendent (Dr. Jan Furman) and other school representatives
July 2007: Letters* sent out to current and former St. Anthony's staff
Survey developed, received IRB approval from HUMC
August 2007- January 2008: Interviews with staff members who responded
Sept 2007: Northvale control group surveyed

Phase I Purpose: Confirmation of anecdotal reports.
Are there a significantly greater number of children with autism or other N/D disorders born to faculty at St. Anthony's than would be expected?

1/30/08: Clarification in writing from Dr. Furman regarding *515 letters.* Mailed to "employees who worked for Region III" who "were employed at one of the sites in which Region III ran programs. One of those sites was St. Anthony's. There is no way to know which site those 515 people worked at, or if they ever worked at the St. Anthony's site." Furthermore, "The district is not able to distinguish teachers who worked at St. Anthony's whether it is for the last 15 years or the last 30 years."

METHODS
- Interviews with staff from St. Anthony's School (Study Group)
- Inclusion criteria: worked at St. Anthony's within past 15 yrs, had children during or since, children 1-15 years old)
- Survey of Northvale control group
- Comparison of study group with local, state historical and national historical controls

RESULTS

STUDY GROUP
Total interviewed: 53
Total qualified by criteria: 28
Total children: 54
Total ND+: 28 (28/54=52%)
Total ASD+: 10 (10/54=18.5%) (NOTE; these 10 are included in the 28)
Mean maternal age (ND+): 38
Mean maternal age (ND-): 35
Mean child age: 5.2

19/28 (68%) faculty have ND+ children
9/28 faculty are full-time teachers
These 9 FT teachers have 18 children in survey
12/18 (67%) are ND+ (vs. 52% of total group)
7 of these 12 are ASD+
Total ASD+ children of FT teachers: 7/18 (39%), or 1/2.5 (vs. 1/12 of rest of group)

Autism Spectrum Disorder (ASD) subgroup (N=10)

- 10 children to 7 women staff
- 9/10 boys
- 3 sets of non-IVF twins
- 7 subjects: all no family history of ASD
- 5/7 full-time teachers

Towns of residence: 20 (majority in Bergen County, NJ)
Family history of ND+/ASD+: no significant difference between groups

CONTROL GROUPS:
Local: Northvale public elementary school (Nathan Hale School)
7 subjects (all female classroom teachers) with children born during or after time working at school
Mean maternal age 34 yrs old, mean child age 4 yrs old
N=15 children in that time frame
Of these 15 children, 2 (13%) diagnosed with a ND disorder (speech disorder, "other neurological disorder"). None diagnosed with an autism spectrum disorder.

State (NJ): 1/100 autism (http://www.cdc.gov/mmwr/pdf/ss/ss5601.pdf)
National: 1/150 autism*, 1/6 ND (http://www.cdc.gov/ncbddd/dd/ddsurv.htm)

CONCLUSIONS:

1. The differences between % of children with ASD in the study group (18.5%) and the control groups (local 0%, state 1%, national 0.67%) were highly statistically significant (p<0.01).

2. The differences between % of children with ND disorders in the study group (52%) and the control groups (local 13%, national 16.7%) were highly statistically significant (p<0.01).

Limitations:

- Need larger control group of children born to special education teachers in Northern NJ
- Diagnosis is by parent report of professional evaluations

2 Statistical Tests – By Children

2.1 Chi-Square Testing

Chi-Square testing compares the observed frequencies in each category of a contingency table with the expected frequencies. It is used to determine whether the deviations between the observed and the expected counts are too large to be attributed to chance.

In this situation, we want to determine whether there is a difference in the percent of children with neurodevelopmental (ND) disorders whose mothers work(ed) at St. Anthony's compared with a control school chosen in the same town (Northvale). To determine this, the null hypothesis was tested:

> **H_0:** The proportion of women who have children with ND disorders among the population of women who have children at St. Anthony's is equal to the proportion of women have children with ND disorders at another Northvale school.

against the alternative:

> **H_A:** The proportion of women who have children with ND disorders are not equivalent in the 2 populations.

Statistical tests were performed using the number of children with and without disorders in both schools.

Counts (Children)

	ND+	ND-
St. Anthony's	28	26
Control	2	13

	ASD+	ASD-
St. Anthony's	10	44
Control	0	15

Analyses:
1) ND disorders: Compared the number of children with ND disorders in the study group to the control group.

Chi-Square testing showed **a highly significant difference** between the 2 populations (the proportions of children with disorders in the 2 groups are significantly different).

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.364(b)	1	.012		
Continuity Correction(a)	4.931	1	.026		
Likelihood Ratio	7.056	1	**.008**		
Fisher's Exact Test				.015	.011
Linear-by-Linear Association	6.270	1	.012		
N of Valid Cases	68				

2) Autism: Compared the number of children with ASD in the study group to the control group.

Chi-Square testing showed **a significant difference** between the 2 populations.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.040(b)	1	.081		
Continuity Correction(a)	1.742	1	.187		
Likelihood Ratio	5.040	1	**.025**		
Fisher's Exact Test				.108	.082
Linear-by-Linear Association	2.995	1	.084		
N of Valid Cases	68				

2.2 Binomial Testing

The binomial test is useful for determining if the proportion of people in one of two categories is different from a specified amount. The specified amount in this case was the control proportion of ND disorders by child (13%). This value can be substituted for the national value.

Analyses:

1) Binomial test performed based on children with ND disorders vs. local rate

Binomial testing shows that the proportion of children with ND disorders is **highly significantly different** than the specified local control proportion (2/15=13%).

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (1-tailed)
ND	Group 1	YES	28	.52	.13	**.000**[a]
	Group 2	NO	26	.48		
	Total		54	1.00		

2) Binomial test performed based on children with ND disorders vs. national rate

This test shows that the proportion of children with disorders is **highly significantly different** than the national average (1/6=16.7%).

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (1-tailed)
ND1	Group 1	YES	28	.52	.167000	**.000**[a]
	Group 2	NO	26	.48		
	Total		54	1.000000		

3) Binomial test performed based on children with autism vs. NJ state rate

This test shows that the proportion of children with autism is **highly significantly different** than the NJ average (1/100=1%).

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (1-tailed)
Aut1	Group 1	YES	10	.19	.01	**.000**[a]
	Group 2	NO	44	.81		
	Total		54	1.00		

4) Binomial test performed based on children with autism vs. national average

This test shows that the proportion of children with autism is **highly significantly different** than the national average (1/150=0.67%).

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Asymp. Sig. (1-tailed)
Aut1	Group 1	YES	10	.19	.007000	**.000**[a]
	Group 2	NO	44	.81		
	Total		54	1.000000		