

## Response: A Response to Blaxill, Baskin, and Spitzer on Croen *et al.* (2002), “The Changing Prevalence of Autism in California”

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We appreciate the thoughtful comments offered by Blaxill, Baskin, and Spitzer regarding our analysis of data on children who are clients in the Department of Developmental Services regional center system in California with a diagnosis of autism or idiopathic mental retardation (MR). We observed an increase in the prevalence of autism over the eight birth cohort study years (1987–1994) and a decrease in the prevalence of idiopathic MR that was of comparable magnitude to the increase observed for autism. Because of reliance on service agency records and incomplete reporting, especially among the youngest children in the study, we recognized that “the observed prevalence is an underestimate of the true prevalence of autism among California-born children.” (Croen, Grether, Hoogstrate, & Selvin, 2002). We discussed a number of administrative and diagnostic changes that occurred over the study period that could have influenced the patterns we observed and concluded that we were unable to determine whether the observed increase in the prevalence of autism was totally an artifact of improved recognition, diagnosis, and client recruitment or whether it may also represent a true increase in the incidence of autism.

Among the several possible explanations discussed, we suggested that the observed increase in the prevalence of autism in this service delivery system might be due in part to reclassification of children from the MR diagnostic category to the autism category in more recent years. It is this possibility of diagnostic

substitution that the above letter addresses. Blaxill *et al.* correctly point out that age patterns of enrollment in this service system may be substantially different for autism and idiopathic MR and that truncated follow-up for children born during the more recent study years might differentially affect the observed trends in prevalence of these two disorders over the study period. That is, not only did we underascertain autism in the later years (which we acknowledged), but we may have underascertained MR to a substantially greater degree (which we did not acknowledge). Blaxill *et al.* assert that the observed decline in idiopathic MR could be an artifact of a relatively later average age of entry into the system for children with this disorder.

To fully evaluate this possibility would require additional years of client data, permitting a more accurate calculation of rates of autism and idiopathic MR among children in the more recent birth cohorts. We have recently obtained an updated data file from DDS, and are continuing to monitor prevalence trends in this population, taking into account changing patterns of age at entry for the different diagnostic groups. We will submit results from these new analyses for peer review in the near future.

As a way of addressing the criticisms by Blaxill *et al.* with our original dataset, we have conducted a reanalysis limiting the data to children who had the same number of years of follow-up across all study years. The data in the figure and table show the probability of becoming a DDS regional center client by 48 months of age, the maximum number of months of follow-up we had for the youngest children in our original dataset, those born in 1994. Diagnostic classification was assigned according to the CDER report closest in time to when the child was 48 months of age. This subset of children represents 49.6% of the chil-

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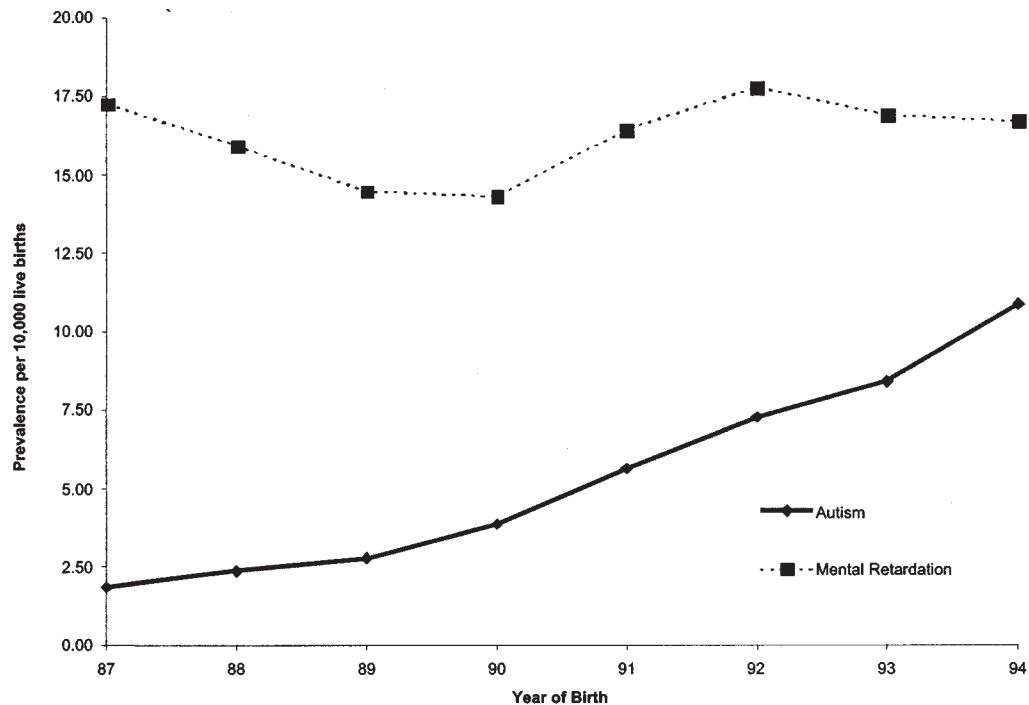


Fig. 1. Probability of becoming a California DDS client by age 4 for autism and mental retardation of unknown cause.

dren with a diagnosis of autism and 66.7% of children with idiopathic MR (without autism) in our original report. Diagnostic substitution does not appear to account for the increased trend in autism prevalence we observed in our original analysis because the probability of becoming a DDS client for MR by age 4 remained relatively constant over the study period, while

the probability of becoming a DDS client for autism by age 4 increased steadily from about 2/10,000 births in 1987 to about 10/10,000 births in 1994, a nearly five-fold increase (Fig. 1, Table I).

Blaxill *et al.* question our use and interpretation of the data derived from the two samples of children whose client charts we reviewed. These samples were

Table I. Absolute and Relative Changes By Year in the Probability of Becoming a DDS Client by Age 4 for Autism and MR of Unknown Etiology

Year of birth	Number of autism cases	Prevalence of autism (per 10,000 births)	Change in autism prevalence from previous year	% Change in autism prevalence from previous year	Number of MR of unknown etiology cases	Prevalence of MR of unknown etiology (per 10,000 births)	Change in MR prevalence from previous year	% Change in MR prevalence from previous year
1987	93	1.85	.	.	868	17.25	.	.
1988	126	2.36	0.51	27.57	848	15.92	-1.33	-7.71
1989	158	2.78	0.42	17.80	824	14.48	-1.44	-9.05
1990	236	3.86	1.08	38.85	875	14.31	-0.17	-1.17
1991	343	5.63	1.77	45.85	1001	16.43	2.12	14.81
1992	436	7.26	1.63	28.95	1068	17.77	1.34	8.16
1993	491	8.40	1.14	15.70	987	16.89	-0.88	-4.95
1994	615	10.86	2.46	29.29	946	16.69	-0.20	-1.18

drawn for feasibility studies conducted before this analysis to evaluate the reliability of the electronic DDS data. Verification of diagnoses in these feasibility studies was based on expert review of abstracted information pertaining to dates and methods of assessment, specialty of assessor, diagnoses, and clinical impressions. These samples do not represent a true validation cohort. We agree with Blaxill *et al.* that the slight degree of diagnostic substitution we observed in these samples would not explain the dramatic increase in the probability of becoming a DDS client for autism by age 4.

Unfortunately, we currently lack the data to evaluate secular changes in autism incidence. By using a standardized case definition and multiple-source case ascertainment strategy over time in a well-defined population, the true rate of occurrence of autism can be evaluated. Fortunately, autism surveillance systems using this methodology have been recently established in several American populations.

Whether or not there has been a true increase in autism incidence, our data and data from several other recent investigations (Bertrand *et al.*, 2001; Chakrabarti & Fombonne, 2001; Baird *et al.*, 2000) indicate that autism is a major public health problem. We firmly

agree with Blaxill *et al.* that additional funds for research on etiology and treatment are needed.

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## REFERENCES

- Croen, L. A., Grether, J. K., Hoogstrate, J., & Selvin, S. (2002). The changing prevalence of autism in California. *Journal of Autism and Developmental Disorders*, 32, 207–215.
- Chakrabarti, S. & Fombonne, E. (2001). Pervasive developmental disorders in preschool children. *Journal of the American Medical Association*, 285, 3093–3099.
- Baird, G., Charman, T., Baron-Cohen, S., Cox, A., Swettenham, J., Wheelwright, S., Drew, A. (2000). A screening instrument for autism at 18 months of age: A 6-year follow-up study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 39, 694–702.
- Bertrand, J., Mars, A., Boyle, C., Bove, F., Yeargin-Allsopp, M., Decoufle, P. (2001). Prevalence of autism in a United States population: The Brick Township, New Jersey, investigation. *Pediatrics*, 108, 1155–1161.