Classification Rates and Relative Risk Factors for Perinatal Events Predicting Emotional/Behavioral Disorders in Children

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Full Text: Headnote ABSTRACT: Perinatal factors were used to predict childhood emotional/behavioral disturbance using a discriminant analysis. A cross validation procedure was employed showing that 20 of 26 factors studied contributed to the separation between groups at clinical levels of accuracy. Frequencies, percentages, and relative risk factors were calculated for each perinatal factor and for the discriminant function. Results were used to argue to a multivariate approach in the examination of a relationship between perinatal events and development of emotional/behavioral disorders in children and adolescents. Medical technology has greatly increased the survival rate for infants born at risk from perinatal complications. However, this has meant greater number of children with potential for development disorders. Indeed, research has suggested that such complications may play a role in the etiology of childhood emotional/behavioral disorders (e.g., Finegan &Quarrington, 1979; McGee, Silva &Willians, 1984; Torrey, Hersh &McCabe, (1975). Arguing from these data, a number of investigations stress that perinatal events should be considered in any attempt to understand the development of emotional/behavioral disorders. Finegan and Quarrington (1979) compared the perinatal histories of 23 autistic children (65% were mentally retarded) and 15 normal siblings. The results of this investigation showed that when compared to the normal frequency of such complications, autistic children experienced a significatnly greater incidence of complicated deliveries, low birth weight, low APGAR scores, haemolytic disease, elevated serium bilirubin, and Respiratory Distress Syndrome (RDS). Moreover, autistic children presented with more complicated preganancies and neonatal risks as well as a significantly higher incidence of amniotic meconmium than their siblings. Using similar research methods, Torrey et al., (1975) showed maternal uterine bleeding was also associated with subsequent development of infantile autism. Recently, McGee et al., (1984) studied factors involved in the development of behavior problems for a slightly disadvantaged group of children with behavior problems. When socio-economic, environmental and medical history variables were studied, "small for gestational age" was found to be the only salient perinatal event directly associated with the later onset of behavioral problems (McGee et al., 1984). A similar line of research has shown that perinatal complications and genetic factors may interact to predispose a subject to psychopathology. In one study, McNeil and Kaij (1978) compared the perinatal histories of schizophrenic, borderline schizophrenic, and normal adults who were born to schizophrenic mothers. The results of this study showed that abnormal fetal position (e.g., breech presentation) occurred with significantly higher frequency in children that were subsequently diagnosed schizophrenic (Parnes, Schulsinger, Teasdale, Schulsinger, Feldman, &Mednick, 1982). Likewise, Parnas et al. (1982) reported a general trend of increased perinatal complications with schizophrenic subjects as compared to their borderline schizophrenic and normal cohorts. In this study, some 67% of the schizophrenics experienced some form of perinatal complication (Parnes et al., 1982). The investigators interpreted these results within Shield's diathesis stress model (e.g. see Wing, 1979), which asserts that the schizophrenic phenotype may be the result of an interplay between a stressful environment and genetic factors. While much of the available evidence suggests a link between perinatal complications and development of emotional/behavioral disorders, few investigations have examined the interaction of perinatal events in the prediction of emotional/behavioral development. Although information regarding the long term effects of specific perinatal complications is of interest, it seems clear that perinatal events may interact to increase the risk of emotional/behavioral disturbance over a given factor in isolation. This

being the case, a multivariate analysis would seem to be a heuristic approach in considering the potential effects of a number of perinatal factors. A number of investigators have demonstrated the utility of a multivariate approach in the study of perinatal factors (e.g., Batchelor, Dean &Gray, 1988; Batchelor, Gray, Dean &Lowery, 1988; Gray, Dean, &Rattan, 1987; Gray Dean, Rattan &Bechtel, 1988; Lester, Emory, Hoffman &Fitzman, 1976). As early as 1965, Fraser stressed the "multifactorial" contribution of perinatal factors in infant development. In general, investigators advocating multivariate methods have argued that the examination of the long term effects of perinatal complications in isolation may lead to inconsistent findings with limited generalizability (e.g., Fraser, 1965; Gray et al, 1987; Gray et al., 1988; Lester et al., 1976). From this point of view, although individual perinatal complications may have little measurable impact upon a child's long term development, the interaction of factors together may influence both cognitive and behavioral functioning (e.g., Fraser, 1965). Clearly, a multivariate approach allows the examination of complex interactions of perinatal events on emotional/behavioral development. For logistical reasons, perinatal research has focused upon emotional functioning in the early childhood period (e.g., Field, Dempsey &Shuman, 1981; Finegan et al., 1979; Torey et al., 1975). Clearly, few studies have considered the role of perinatal complications in emotional disorders with a late childhood or adolescent onset. With many emotional/behavioral problems not being manifested until later childhood and adolescence (e.g., Biehler &Hudson, 1986), it seems important to follow high risk infants beyond this early childhood (Hunt, 1981). The present investigation was designed to examine multivariate relationships between perinatal complications in the prediction of abnormal emotional function for a group of school aged children. Specifically, the degree to which perinatal events would differentiate children with behavioral disorders from normal controls was investigated. This approach was thought to provide potential insight into the relationship between perinatal events and the onset of emotional/behavioral disturbance. In addition, the frequency of perinatal complications for both normal children and those with behavior disorders was considered, and the relative risk of behavioral disorders was calculated for each perinatal event. Such a risk estimate may offer some utility to the clinician in the early identification of high risk children. METHOD Subjects Participants were 37 children from a midwestern psychiatric hospital diagnosed with severe emotional/behavioral disorders; 119 children from the same region were taken from self-contained classrooms for the severely emotionally handicapped; and 211 normal school age children from any small midwestern city. Subjects with emotional/ behavioral disorders were diagnosed by a licensed Ph.D. Clinical Psychologist. The normal subjects were screened for developmental, emotional/behavioral and learning disorders. Subjects in each group came from lower-middle class to middle class socioeconomic backgrounds as determined by the occupation of the household's major wage earner. Children ranged in age from 113.04 to 136.5 months. All children were born in hospitals with verifiable birth histories. None of the subjects were mentally retarded or had frank neurologic impairment. Procedure Information concerning the children's perinatal histories was obtained from each subject's biological mother using the Maternal Perinatal Scale (MPS) (Dean &Gray, 1985). Moreover, mothers were individually instructed to read each question and response category before indicating their answer in the space provided. The MPS is a highly structured 26 item self report measure designed to obtain information regarding the mother's medical history, pregnancy, delivery and predischarge neonatal periods of life (see Gray, Dean &Rattan, 1987). Items require recognition of response categories rather than recall of specific perinatal information. For each item, lower scores are indicative of less risk. Items included on the MPS were constructed from known or suspected risk factors occurring during the perinatal period, and having implications for later functioning (see Osofsky, 1979). Some 64% of the MPS items are measured on a continuum ranging from 1.0 (i.e., least) to 6.0 (i.e., most). For example, a 1.0 response indicates that the mother gained less weight during pregnancy than a 6.0 response. The remaining 32% of the items were initially constructed on a nominal scale of measurement. These items were rated by 20 pediatricians along a continuum of risk in relation to the child's functioning. Ratings for each of these latter response categories were then averaged. In this way, previous nominal scale responses were given ordinal scale properties. These items

ranged from lowest (1.0) to highest (5.0). Mother's responses to items on the MPS have been shown to be consistent with medical records (Gray, Dean, Rattan, &Bechtel, 1988). Indeed, some 91% of the MPS items correlated at levels of .90 and above with information in mother's hospital charts.

Table 1
Twenty-Six MPS Items Used as Predictor Variables

Item Numbers	*Variable*
1	Mother's weight just prior to pregnancy
2	Mother's height at pregnancy
3	Father's height at pregnancy
4	Number of prior pregnancies
5	Amount of vaginal bleeding
6	Type of anesthesia used in delivery
7	Neonatal birth weight
8	Stress level over the course of gestation
9	Length of gestation
10	Length of labor
11	Weight gain by mother during pregnancy
12	Mother's age at child's birth
13	First physician consult during pregnancy
14	Amount of edema during pregnancy
15	Medical induction of labor
16	Use of forceps
17	Degree of pregnancy planning
18	Multiple pregnancy
19	Medication taken during pregnancy
20	Presentation of the neonate at birth
21	Membrane rupture-start of labor log
22	Color of neonate shortly after birth
23	Prior gynecological surgery
24	Prior problem pregnancies
25	Average number of cigarettes smoked per day during pregnancy
26	Average amount of alcohol consumed per day during pregnancy

Items of the MPS assessing various factors of the perinatal period and prior to pregnancy are presented in Table 1. Cutoff scores used in calculating relative risk factors, proportions, and frequencies of children at risk were obtained from comprehensive literature reviews (see Gray &Dean, in press; Batchelor, Dean, &Gray, 1988). For example it has been shown that mothers under 15 years or over 35 years of age are at increased risk for perinatal complications (Naeye &Tajari, 1983). Moreover, labor exceeding 16 hours clearly increases the likelihood of a complicated delivery (Naeye &Tafari, 1983). Relative risk estimates were made using a cross products ratio recommended by the National Institute of Health for epidemiology studies (Susser, Hauser, Kiely, Paneth, &Stein, 1985). The relative risk of developing a given disorder was equal to ad/bc using the following index:

	Disorder	
Factor	*Present (Case)*	*Absent (Control)*
Present	**a**	**b**
Absent	**c**	**d**

RESULTS Information concerning each subject's perinatal period of life was collected from their biological mother using the measure described above. Each perinatal variable was considered in a continuous fashion and relative to a cutoff score for risk as explained previously. To examine the predictive efficiency of perinatal

information in distinguishing group membership (psychiatric hospital, emotionally disturbed and normal) data were considered in a multivariate fashion using a stepwise discriminate analysis. In an effort to consider the generalizability of the findings, the entire sample of 363 children was randomly divided by group into an analysis (N = 172) and cross validation (N = 181) sample. The stepwise discriminant analysis was performed with the 26 perinatal variables serving as predictors of subject's group membership (normal vs. emotionally disturbed classroom vs. psychiatric hospital). As shown in Table 2, of the possible predictors, 13 variables comprised a single function which added significantly to the amount of centroid separation, (26) = 93.10, p <.001. Orthogonal contrasts (Wilks Lambda) of the means indicated significant (p <.05) group differences for each of these 13 variables. The relative magnitude of the standardized discriminant coefficients noted in Table 2 provide information regarding the relating importance of each predictor variable in discriminating between groups. Standardized discriminant coefficients .20 and greater were considered to offer significant contribution in the discriminant function. From an examination of Table 2 it is clear that medical induction of labor, natural weight gain, birth weight, gestational age, degree of pregnancy planning, history of cigarette smoking and consumption of ethanol during pregnancy, use of forceps and anesthesia, and stress during pregnancy were salient predictors of group differences.

Table 2
Perinatal Items Involved in the Discriminant Function Predicting Group Membership for the Hospitalized, Outpatient and Normal Subjects

Variables	*Wilks Lambda*	*Standardized Discriminant Coefficients*
Mother's Weight Prior to pregnancy	.56	.19
Anesthesia	.57	.27
Birth Weight	.58	−.33
Stress During Pregnancy	.68	.22
Gestational Age	.59	.36
Maternal Weight Gain	.72	−.21
Medical Induction of Labor	.70	−.39
Use of Forceps	.63	.21
Planned Pregnancy	.76	.22
Medication Ingested by Mother	.61	.19
Hypoxia	.65	.26
Inhalation of Cigarette Smoke	.80	.80
Ingestion of Ethanol	.62	−.25

A measure of the group means of the composite variables, the group centoids in reduced space were -.6456 (normal), .7340 (emotionally disturbed classroom), and 1.5850 (psychiatric hospital). The canonical correlation between the one significant function and the levels of group membership was .63, indicating that some 40% of the variability could be accounted for by a linear composite of perinatal variables. An examination of the standardized discriminant function coefficients offered in Table 2 in conjunction with the group centroids, suggested that normals could be best distinguished from both pathological groups by a linear component described by cigarettes smoked, less labor induced, lower birth weight, increased use of general anesthesia, older gestational age at birth, and higher incidence of hypoxia. Using this one discriminant function, the group membership for 64.3% (p <.01) of the subjects was correctly identified. As would be expected from the group centroids, the pattern of false positives and negatives suggested that the greatest misclassification occurred in predicting membership between groups of emotionally disturbed subjects. Using the discriminant function

established in the prior analysis, the group membership of the 181 subjects in the cross validation sample was attempted. Similar to the above findings, 60.5% ($p < .01$) of the children in the cross validation sample were correctly classified. The pattern of false positives and negatives again suggested that errors in group placement were more likely to occur in the prediction of emotionally disturbed groups. To further clarify the relationship between perinatal factors and emotional disturbance, another discriminant analysis was conducted after collapsing the distinction between emotionally disturbed children. Of the 26 perinatal predictors, 20 were found to add sign significantly to the prediction of group membership, (20) = 133.05, $p < .001$. Orthogonal contrasts (Wilks Lambda) between each of these variables in Table 3 were significant ($p < .05$). Table 3 shows that more cigarettes smoked, prior problem pregnancies, increased maternal stress during pregnancy, decreased need for artificial induction of labor, younger maternal age, lower birth weight, increased incidence of hypoxia, increased maternal weight prior to pregnancy, and increased use of medication during pregnancy predicted were salient predictors of emotional disturbance. The group centroids were - .5672 for normals and .9138 for behavior disordered children. The canonical correlation for the one significant discriminant function was .59. Thus, some 36% of the variability in group membership could be attributed to a linear combination of these 20 variables. This single function of perinatal variables offered correct placement of cases with some 79% accuracy.

Table 3
Perinatal Items Involved in the Discriminant Function Predicting Group Membership for the Psychiatric and Normal Subjects (Accuracy 79%)

Variables	*Wilks Lambda*	*Standardized Discriminant Coefficients*
Mother's Weight Prior to pregnancy	.81	.23
Mother's Height	.67	.17
Vaginal Bleeding	.67	−.14
Anesthesia	.68	.16
Birth Weight	.75	−.28
Stress During Pregnancy	.84	.38
Length of Labor	.67	.13
Mother's Age at Pregnancy	.73	−.31
Consultation of Physician	.16	.19
Medical Induction of Labor	.77	−.34
Use of Forceps	.72	.17
Planned Pregnancy	.79	.17
Multiple Pregnancy	.66	.14
Medication Ingested by Mother	.70	.22
Presentation of Fetus at Birth	.66	.14
Hypoxia	.70	.21
Prior Gynecological Surgery	.68	−.18
Prior Problem Pregnancies	.71	.30
Inhalation of Cigarette smoke	.89	.50
Ingestion of Ethanol	.66	−.14

Data concerning the incidence of perinatal risks for normal and behavior disordered children are presented in Table 4. It was clear from this display that the behavior disordered group had a higher than normal incidence of perinatal complications. These data were next used to estimate the relative risk of behavioral disorders for each perinatal factor (after Mantel, 1963). An odds ratio, this index allows the comparison of the incidence rate of a disorder in an exposed and unexposed group. These risk rations ranged from .59 for induced labor to 4.34 for their mother's use of tobacco during pregnancy. For example, mothers who smoked tobacco during pregnancy were 4.34 times more likely to have a child who went on to be identified as behavioral disordered. When the relative risk was estimated using the overall discriminant function it was found that children were 2 to 3 times

more likely to have a behavioral disorder when they were predisposed by the composite perinatal variables noted in Table 2. The present results confirm and extend previous results implicating individual perinatal complications as precursors to emotional /behavioral disorders (e.g., Fields et al., 1981; Finegan &Quarrington, 1979; Rutt &Offord, 1971; Torrey et al., 1975). These results were unique in that they showed the importance of considering the multivariate relationship between perinatal events in predicting emotional disturbance. The following factors were the most salient predictors of emotional disturbance of higher maternal stress, lower maternal age, decreased need for medical induction of labor, increased number of prior problem pregnancies, greater number of cigarettes smoked and lower birth weight. A child was some 2.5 times more likely to have a behavioral disturbance with such a linear combination of factors. These data showed that in combination, both mothers' characteristics (e.g., level of stress, age) and perinatal factors (e.g., birth weight, teratogenic stress on the fetus), were highly related to childhood emotional/behavioral disorders. The present findings are consistent with what might be expected given previous findings linking family stress (e.g., McGee, et al., 1984; Warner &Smith, 1979) and perinatal complications (e.g., Field, et al., 1981; Torrey, et al., 1975) with development of childhood emotional/behavioral problems. Indeed, the present results may be useful in hypothesis building of pathways of multivariate relationships between risk factors contributing to emotional/ behavioral problems in children.

Table 4
Proportion, Frequency and Relative Risk of Behavioral Disorder for Each Item

Perinatal Factor	*Proportion With Risk Factor*		*Relative Risk of Behavioral Disorder*
	Normal	*Behavior Disorder*	
Smoke Infestion During Pregnancy	.15	.43	4.34
Maternal Stress (Much Throughout Pregnancy)	.12	.36	4.22
Consultation of Physician After the 1st Trimester	.08	.24	3.78
After the 1st Trimester	.08	.24	3.78
Unhappy About Pregnancy Unmarried, or Both	.10	.30	3.61
Overweight Mother (< 151 lbs.)	.06	.18	3.44
Low Birth Weight (< 4.lbs.)	.03	.10	3.37
Anesthesia (Saddle Block)	.13	.30	2.87
Preterm Delivery (< 8 mos.)	.08	.18	2.75
Anesthesia (None)	.61	.38	2.64
Mother: Under 15 years	.09	.23	2.61
Mother: Less than 5 ft. 0 in.	.04	.18	2.57
Multiple Pregnancy (> 2)	.01	.03	2.36
Abnormal Presentation of Fetus	.05	.11	2.14
Vaginal Bleeding During First Trimester	.09	.04	2.13
Edema Throughout Pregnancy	.13	.23	2.04
Ingestion of Medication Other than Vitamins During Pregnancy	.12	.21	1.90

Too Little Weight Gain (< 17 lbs.)	.15	.23	1.74
Vaginal bleeding Throughout Pregnancy	.02	.14	1.53
Length of Labor (> 16 hrs.)	.11	.16	1.53
Prior Problems Pregnancies (e.g., Stillbirths, miscarriages, etc.)	.10	.15	1.46
Premature Rupture of Membranes (Time from rupture to labor > 2 hrs.)	.06	.09	1.42
Vaginal Bleeding Last Trimester	.07	.10	1.33
Anesthesia (General)	.27	.32	1.24
Hypoxia	.11	.13	1.18
Use of Forceps	.15	.17	1.14
Excess Weight Gain (> 35)	.21	.22	1.05
Mother Over 35 Years	.06	.04	1.04
Pst Term Delivery (< 9 months)	.18	.18	.95
Underweight Mother (< 90 lbs.)	.014	.019	.72
Ethanol Ingestion During Pregnancy	.07	.05	.63
Medically Induced Labor	.21	.14	.59

In the past, multivariate relationships have been shown between factors measuring Psychosocial Stress, Teratogenic Stress and Birth Weight/Gestational Age suggesting a hierarchical stress factor exists (Gray &Dean, in press b). The present data suggest that intercorrelations between perinatal complications and pre-existing maternal conditions may have obscured relationships between individual perinatal items and subsequent development of emotional/behavioral disorders in previous studies. Support for this view is offered by Gray and Dean's (in press b) factor study of the Maternal Perinatal Scale and the correlation matrix of the present study. There were high correlations between variables in the present study characterizing factors previously described by Gray and Dean (in press b). For example, the Psychosocial Stress factor was characterized by maternal stress, consultation of the physician, and pregnancy planning (Gray &Dean, in press b). The relationships between these three variables were also noted in the correlation matrix of the present study. Considering the apparent interrelationships among environmental and physiological factors surrounding the birth process, future studies examining the interaction between maternal characteristics and perinatal events impacting on emotional development would seem instructive. Although a multivariate prediction from perinatal events proved useful in considering emotional/behavioral disorders, the present results also showed the potential clinical importance of considering relative risk of individual factors. Tables 3 and 4 showed that emotionally disturbed children experienced a higher frequency of most perinatal complications. These data also showed that many of the reported salient perinatal risk factors were predictors of emotional disturbance (e.g., maternal stress, smoke inhalation, low birth weight, and the like). Although carrying lower weights in the discriminant function, other variables (e.g., consultation with the physician, pregnancy planning, anesthesia, preterm neonate, mothers under 15 years, multiple pregnancy, and edema) also increased the risk of emotional disturbance. These data reveal the multivariate relationship between perinatal events and emotional disturbance. However, it is important to note that both discriminate coefficients and relative risk were found

useful in evaluating perinatal events for subsequent development of emotional/behavioral disorders. Such a combined approach would seem useful in identifying infants at risk for developing emotional/ behavioral problems in the clinical setting. References REFERENCES Batchelor, E.S., Dean, R.S. &Gray, J.W. (1988). Perinatal complications and related factors in developmental disability: Implications for the school psychologist. Newsletter for the Social/Emotional, 5, 17-22. Batchelor, E.S., Gray, F.W., Dean, R.S. &Lowery, R. (1988). The interaction between perinatal events and socioeconomic status. Paper presented at the Annual Convention of the National Association of School Psychologists, (April, 1988). Biehler, R.F. &Hudson L.M. (1986). Developmental psychology: An introduction. Boston: Houghton Mifflin Company. Dean, R.S. &Gray, J.W. (1985). Maternal Perinatal Scale. Nuncie, IN: Ball State University. Field, T.M., Dempsey, J.R. &Shuman, H.H. (1981). Developmental follow-up of pre- and posterm infants. In S.L. Friedman &M. Sigman (Eds.), Preterm birth and psychosocial development New York: Academic Press. Finegan, J. &Quarrington, B. (1979). Pre- peri- and neonatal factors and infantile autism. Journal of Child Psychology and Psychiatry, 20, 119-128. Fraser, F.C. (1965). Some genetic aspects of teratology. In J. Wilson &J. Wakany (Eds.), Teratology: Principles and Techniques. Chicago: University of Chicago Press. Gray, J.W. &Dean, R.S. (in press a). The effects of perinatal complications on the future development of children. Journal of School Psychology. Gray, J.W. &Dean, R.S. (in press b). Underlying factor structure of the perinatal events. Journal of Child Psychology. Gray, J.W., Dean, R.S. &Rattan, G. (1987). Assessment of perinatal risk factors. Psychology in the Schools, 24, 15-21. Gray, J.W., Dean, R.S., Rattan, G. &Bectel, B.A. (1988). Mothers' self report of perinatal information. Journal of Clinical Child Psychology, 17, 242-247. Hunt, J.V. (1981). Predicting intellectual disorders in childhood for preterm infants with birthweights below 1501 grams. In S.L. Freeman, M. Sigman (Eds.), Preterm birth and psychosocial development New York: Academic Press. Lester, B.M., Emory, E.K., Hoffman, S.L. &Fitzman, D.V. (1976). A multivariate study of the effects of high-risk factors on performance on the Brazelton Neonatal Assessment Scale. Child Development, 47, 515-517. Mantel, N. (1963). Chi-square tests with one degree of freedom: extensions of the MantelHaenszel procedure. Journal of American Statistics, 58, 690-700. McGee, R. Silva, P.A. &Williams, S. (1984). Perinatal, neurological, environmental, and developmental characteristics of seven-year-old children with stable behavior problem. Journal of Child Psychology, 25, 573-586. McNeil, T.F. &Kaif, L. (1987). Obstetric factors in the development of schizophrenia: Complications on the births of preschizophrenics and in reproduction by schizophrenic parents. In L.C. Wynne, R.L. Cromwell, &S. Mathysse (Eds.), The nature of schizophrenia: New approaches to research and treatment New York: Wiley. Naeye, R.L. &Tafari, N. (1983). Risk factors in pregnancy and diseases of the fetus and newborn. Baltimore: Williams &Wilkins. Osofsky, J.S. (1979). Handbook of infant development New York: Wiley. Parnes, J. Shulsinger, F., Teasdale, T.W., Schulsinger, H., Feldman, P.M. &Mednick, S.A. (1982). Perinatal complications and clinical outcomes within the schizophrenia spectrum. British Journal of Psychiatry, 140, 416-420. Rosen, M.C. (1985). Factors during labor and delivery that influence brain disorders, In J.M. Freeman (Ed.) Prenatal and perinatal factors associated with brain disorders (NIH Pub #85-1149). Bethesda, MD: NIH. Rutt, C.N. &Offord, D.R. (1971). Prenatal and perinatal complications in childhood schizophrenics and their siblings. Journal of Nervous and Mental Disorders, 152, 324-331. Susser, M., Hauser, W.A., Kiely, J.S., Paneth, N. &Stein, Z. (1985). Quantitative estimates of prenatal and perinatal risk factors for perinatal mortality, cerebral palsy, mental retardation, and epilepsy. In S.M. Freeman (Ed.), Prenatal and perinatal factors associated with brain disorders (NIH Pub #85-1149). Bethesda, MD: NIH. Torrey, E.F., Hersh, S.P. &McCabe, K.D. (1975). Early childhood psychosis and bleeding during pregnancy: A prospective study of gravid women and their offspring. Journal of Autism and Childhood Schizophrenia, 5, 287-297. Werner, E.E. &Smith, R.S. (1979). An epidemiological perspective on some antecedents and consequences of childhood mental health problems and learning disabilities. Journal of American Academic Child Psychiatry, 18, 292-306. Wing, J.K. (1979). Social influences on the course of schizophrenia. In L.C. Wynne, R.L. Cromwell &S.M. Matthysse (Eds.), The nature of schizophrenia: New approaches to research and treatment, pp. 599-616. New York: Wiley. AuthorAffiliation Ervin S. Batchelor, Jr.,

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