Perinatal Origin of Eventual Self-Destructive Behavior

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Abstract: None available.

Full Text: Headnote ABSTRACT: This paper summarizes results of three investigations: an ecological study dealing with the epidemiology of self-destructive behavior in the United States (unpublished), a case-control study of forensic victims in Stockholm,1 and preliminary results from an ongoing study of amphetamine addicts in Stockholm.2 The results seem alarming. The revealed data suggest that obstetric methods should be modified to prevent damages to future generations. ECOLOGICAL STUDY As is often the case in science, it was an accidental discovery that led to the epidemiological study in the United States. During the development of computer programs for investigating the epidemiology of certain somatic diseases, a most remarkable regularity was observed in the rate of several diseases for each age cohort in each state. Unexpectedly, the same regularity was found for rates of suicides and for female rates of alcoholism as reflected by death rates for cirrhosis of the liver. Each age cohort in each state is characterized by a certain risk to commit suicide. This risk is fairly constant for cohorts in each state in relation to other age cohorts in the same state, and in relation to the same age cohort in other states. This is illustrated in Figure 1. The relative mortality rates are shown for an age cohort born in the late 1910's at two periods 20 years apart. Hence, the victims were born during essentially the same period, but committed the suicide 1937 to 1940 and 1956 to 1960. The similarity is striking. Other age cohorts have different geographic distributions. This suggests the suicide rate somehow could be dependent on the birth period and the state where the individual is born. By an analysis of correlation matrices of death rates, this can be shown to hold true for age cohorts between 15-19 and 60-65 for those who committed suicide between 1937 to 1975 in the United States. There can only be one explanation-that suicide must have been caused, at least partly, to an environmental factor that has varied with time in the characteristic manner affecting each age cohort in each state to a varying degree. Such systematic variations offer a possibility to trace their origin. Attempts to do so was made for suicides by multiple regression techniques. Twelve possible risk factors were considered during the life span of the victims. Socio-economic conditions (median income and unemployment) of the victims at time of death were irrelevant. A broken home during childhood was statistically significant, which is in agreement with earlier studies of relevant risk factors for suicide proneness. Similarly, parental alcoholism, particularly for mothers, was significant. Factors estimating the quality of caretaking environment during infancy were not found significant. The same result was obtained for congenital factors, as estimated for surviving infants from perinatal death rates for congenital malformations. Birth injury was found to be significant. Hence, the variations for suicides in the various states are more closely associated with the rate of birth injury for the cohorts than with 11 other tested risk factors including socioeconomic variables. The results were surprising and the study was repeated by separating the population into white males, white females, black males and black females-the associations with the birth injury factor then became even more apparent. The results are examplified in Figure 2 for the 15-25 age cohort committing suicide 1971 to 1975. The regression coefficients are mean values and standard deviations for the four population categories. The study clearly indicated that obstetric procedures could be of importance for adult behavior. CASE-CONTROL STUDY OF FORENSIC VICTIMS It seemed obvious that these results based on ecological data had to be checked by a case-control study. Since it is possible in Sweden to trace the birth hospital of an individual from a persons social security number, it was decided to make the study in Stockholm.

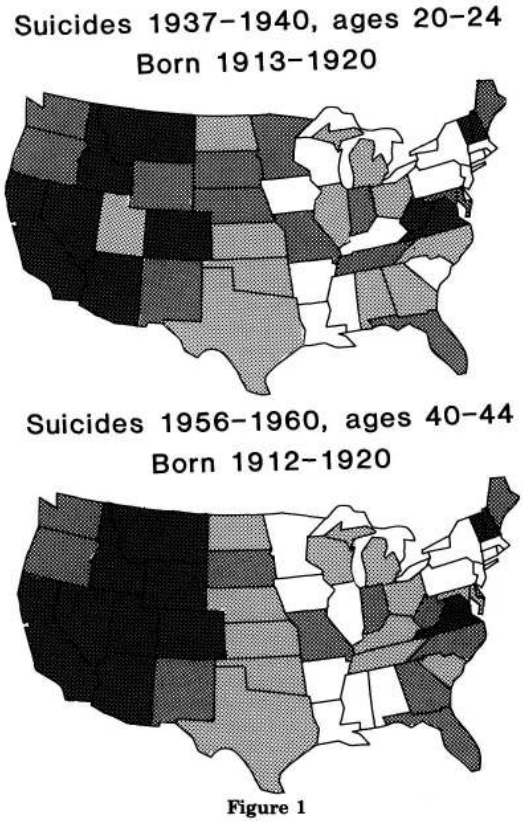

Figure 1

Distribution in the United States of suicides during two periods 20 years apart for an age cohort born 1913–1920.

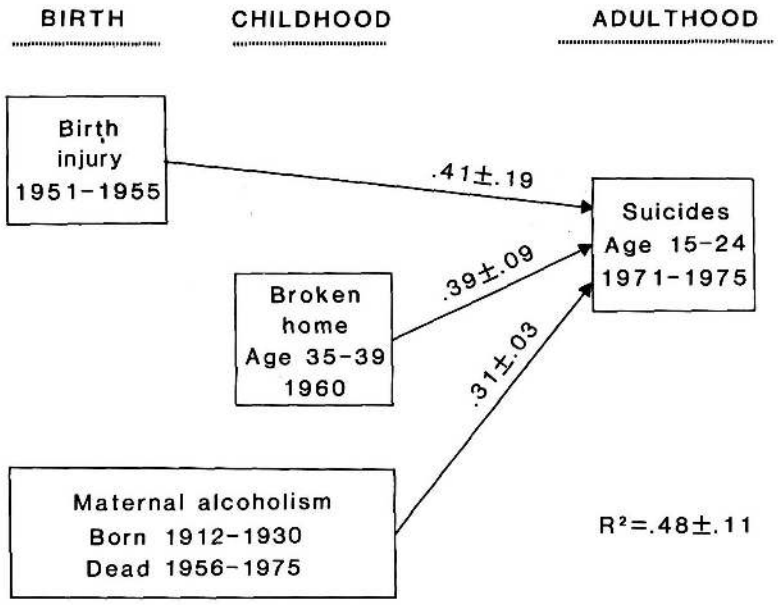

Figure 2

Model for determination of regression coefficients for suicides committed in the United States 1971–1975. Coefficients are mean values and standard deviations for four population categories: white males and white females in the 24 states with the highest white population, and black males and black females in the 11 states with the highest black population. R^2 is mean coefficient of multiple correlation.

The material comprises all unambiguous cases of suicide victims (n = 281), alcoholics (n = 66) and drug addicts (n = 106) born at an identifiable hospital in Stockholm or vicinity after 1940, and upon which autopsies were performed at the State Institute of Forensic Medicine in 1978-1984. The diagnostic criteria for the three categories were as follows. For the suicides either a suicide note or a clearly expressed intention to end life was required. For the alcoholics characteristic tissue changes in liver and pancreas were required as was confirmation from social authorities regarding known severe abuse of alcohol. For the drug addicts multiple scars from injection needles as well as confirmation from police records and/or social authorities constituted diagnostic criteria. For all three victim categories analysis for alcohol and drugs including narcotics were done and results evaluated. Most birth records could be retrieved: 263, 53 and 96, respectively. The percentages males were 81.4, 81.1 and 72.9, respectively. A control material comprising 2,901 birth records was gathered from six major hospitals in Stockholm (ABB, KS, SABB, SE, SBB and SOS) for 1940-1960, for which period records have been collected in sequential order in central archives for five of the hospitals. For these the material was acquired for each of the 21 years by extracting information from a desired number consecutive records for live births, that is, one percent of the annual total records for the particular hospital. For the KS hospital the material was arranged differently which led to a random sampling of the same number of desired annual birth records. To control for gender, the material comprises 25% female and 75% male births. A special study was made of the administration of opiates and barbiturates during 1944-1960 at five of the six hospitals (excluding KS because of difficulties retrieving records). 8,720 records were used to determine the annual percentage records with data on the administration of the two drugs. The gathering of data was designed with the purpose of testing two hypotheses. Obstetric Care Hypothesis The obstetric care hypothesis proposes that obstetric procedures may cause injuries leading to adult self-destructive behavior. Since such procedures are likely to vary locally, we have investigated to what extent differences occur in birth rates of eventual victims with time and hospital, and tried to tie such differences to specific obstetric practices. The distributions of births of two suicide categories, alcoholics and drug addicts-relative to the total percentage of births at the six hospitals-are shown in Figure 3. The hospitals have been arranged in an order determined by decreasing socio-economic affluence of the tract where located; the ABB hospital being in the most affluent area. There were no major differences between the hospitals regarding medical standards, principles for admission of patients or charges.

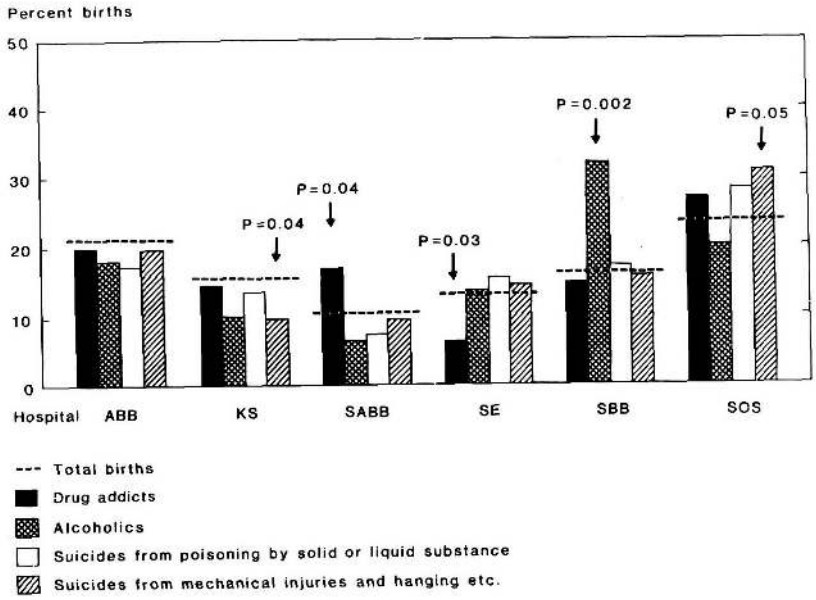

Figure 3

Percentage distribution among the six major obstetric clinics in Stockholm of births 1940 to 1965 of drug addicts, alcoholics and two suicide categories who died in Stockholm 1978 to 1984. Dotted lines show percentage of total births at the six hospitals. P-values show significance of uneven distributions. (From Jacobson et. al.[1] by permission Munksgaard International Publishers Ltd.)

The distribution of the births of victims among the six hospitals differs with cause of death. For the combined category of suicides from all mechanical injuries including hanging and strangulation (N = 125), the SOS hospital accounted for 30.4% while 23.6% of the total births occurred there (P = 0.05, calculated from the binomial distribution). For the KS hospital the percentages are 9.6 and 15.6, respectively (P = 0.04). Of the alcoholics (N = 60) proportionally too many were born at the SBB hospital with percentages 31.7 and 16.0 (P = 0.002). Similarly, of the drug addicts (N = 94) too many were born at the SABB hospital, 17.0 and 10.5%, (P = 0.04). At the SE hospital the percentage births of addicts was low, 6.4 and 13.1, respectively (P = 0.03). The occurrence of the births of victims was, in several instances, clustered in well-defined periods with pronounced peaks certain years that differ with hospital and type of behavior. This is examplified in Figure 4 for the drug addicts. The scales for the number of births for the various hospitals and years have been normalized so that the heights of the bars show the birth rate per 1,000 total births. Hereby, the diagrams can be compared to the rate of administration of barbiturates at the five hospitals during 1944-1960. The observation that the births of victims were clustered both with respect to hospital and time suggests that obstetric procedures do constitute a risk factor. The similarities in distributions of births of eventual drug addicts and distribution of administered barbiturates, as seen in Figure 4, are rather apparent in spite of the fact that the birth rate of addicts is associated not only with the administration of barbiturates to their mothers during labor but with the administration of opiates and chloroform as well. But the administration rates for the latter two drugs do not show any transient peaks as do the rates for barbiturates. Socio-economic differences, which vary slowly, are not likely to have induced the abrupt changes of rates. Of exceptional interest is the accumulation of births of addicts 1954-1955 at the SOS hospital. During this period, barbiturates were administered routinely to many healthy mothers. A recurrent entry in the records was 'No sign of toxemia; 0.1 g phenobarbital given,' which indicates that the drug was administered as a prophylactic. The clustering of births at this hospital strongly

suggests that this transient procedure constituted a specific risk factor. This observation, as well as the observed close associations between administered opiates and/or barbiturates and eventual drug addiction, constitutes support for the obstetric care hypothesis. We concluded that it is probable that a causal relationship prevails between obstetric medication and drug addiction in adulthood. Imprinting Hypothesis The second hypothesis relates to the mechanism by which a birth trauma could be transferred to adulthood. It was proposed that this occurred by an imprinting process, similar to what has been demonstrated in all classes of animals, from insects to mammals. According to the imprinting hypothesis there is a tendency for an adult to repeat a traumatic event that occurred during birth. To check this hypothesis three different types of birth trauma have been considered. It was investigated (i) whether fetal asphyxia constitutes a risk factor for committing suicide by means involving asphyxiation, (ii) whether mechanical birth trauma constitutes a risk for committing suicide by mechanical means and (iii) whether drugs administered to the mothers during labor constitute a risk for the infant to choose, as an adult, a lifestyle as an alcoholic or drug addict. Moreover, it was tested (iv) whether drugs impair imprinting by mechanical birth trauma.

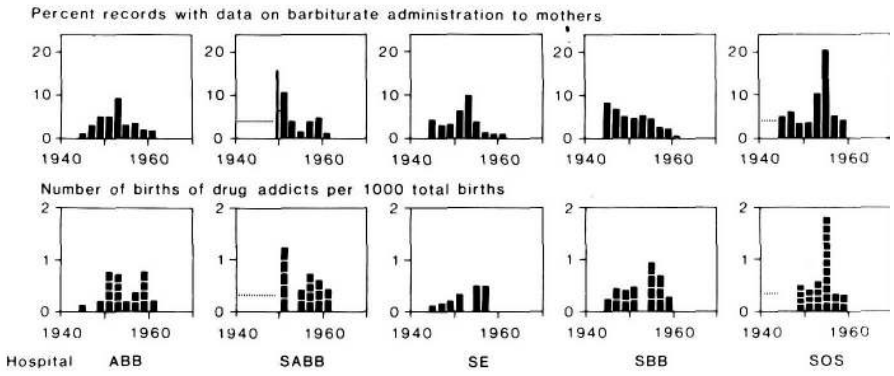

Figure 4

(Top) Percentage birth records with data on administration of barbiturates during labor within ten hours before delivery at five Stockholm hospitals during 1944–1960. The percentages are calculated from 8,720 records of live births. (Bottom) Number of births of eventual drug addicts per thousand births among the 106 studied cases who died in Stockholm 1978–1984. Each rectangle represents one case. Dotted line shows period during which hospital had not yet opened. (From Jacobson et. al.[1] by permission Munksgaard International Publishers Ltd.)

The detailed analysis of birth records involves a comparison with controls as well as a mutual comparison of certain victim categories. When comparing cases with controls, the significance of the occurrence of risk factors was determined by calculation of probabilities from the binomial distribution. To make a correct comparison, only cases born 1940-1960 were utilized, that is, for the same period as for the control material. Mutual comparison of victim categories was made by chi square analysis. Then all cases were included. Considered risk factors comprise breech presentation, twin births, forceps delivery (Caesarean section was rare among cases and controls), asphyxia, nuchal entanglement, and administration to mothers within ten hours before delivery of opiates, barbiturates, nitrous oxide and chloroform. These factors were listed for seven victim categories including five different means of suicide (see footnote Table 2). To obtain sufficient number of observed or expected cases, risk factors and categories were sometimes combined into groups as required to test the hypothesis. Imprinting by birth asphyxia. Asphyxiation is an essential cause of death for suicides by hanging, strangulation, drowning, and poisoning by gas. Hence these categories were combined. According to the imprinting hypothesis this combined group should have an increased rate of asphyxia during birth. The rate

is more than four times as high as for the controls (P = 0.00005), Table 1. The rate for the controls, 2.31%, is a comparatively low value indicating that only severe cases were recorded. Asphyxiation is not involved in suicides from poisoning by solid or liquid substance. This category had a significantly lower rate of birth asphyxia as compared to the suicides involving asphyxiation (P = 0.01), Table 2. If the alcoholics are added to the low risk category the difference becomes highly significant (P = 0.001), Table 2. Imprinting by mechanical birth trauma. Mechanical injuries are involved in suicides from hanging, strangulation, jumping from heights, firearms etc. This combined category (N = 126) had an increased rate of mechanical birth trauma involving the head and traction of the neck (breech presentation, forceps delivery and nuchal entanglements with multiple loops) as compared to controls (P = 0.0001), Table 1. The suicide group involving mechanical trauma, contrary to other suicides, had a high rate of twin births, 5.56% (controls 1.07%, P = 0.0005). This finding is in agreement with the mechanism hypothesis, since being a twin, besides other differences, undoubtedly involves increased mechanical stimulation in the womb. Mechanical injuries are not involved in suicides from poisoning by solid and liquid substance, or by gas or from drowning. This combined group had a significantly lower rate of mechanical birth complications involving the head and neck than the suicides involving mechanical injuries (P = 0.01), Table 2.

Table 1

Comparison of Victim Categories with Controls. (From Jacobson et. al.[1] by permission Munksgaard International Publishers Ltd.)

Perinatal Risk Factor	*Victim Category*	*Total Number Cases*	*Percent With Risk Factor*	*Controls Percent*	P
Asphyxia	Suicides from hanging and strangulation + drowning + poisoning by gas	110	10.0	2.31	0.00005
Mechanical trauma*	Suicides from hanging etc + other mechanical injuries	126	20.6	9.14	0.0001
Opiates	Drug addicts	94	17.0	6.26	0.0002
Barbiturates	Drug addicts	94	13.8	4.37	0.0002
Opiates and/or barbiturates	Drug addicts	94	24.5	9.55	0.00002

*Breech presentation, forceps delivery and multiple nuchal loops

Imprinting by pain medication. A preferred emotional state of a drug addict is an altered mood. Hence, it is relevant to study the amount of opiates and barbiturates administered during labor. The doses ranged from 0.01 to 0.02 g morphine, 0.05 to 0.1 g meperidine hydrochloride, or 0.05 to 0.2 g phenobarbital (two other barbiturates were given in sedative or hypnotic doses in a few cases). Considered were only cases when the drugs were administered within ten hours of delivery. Of the mothers of the addicts more than twice as many had been administered opiates as compared controls (P = 0.0002), Table 1. Barbiturates were administered about three times as often (P = 0.0002). Opiates and/or barbiturates were given to about one fourth of the mothers of the addicts (P = 0.00002). It has been excluded by an analysis according to Mantel-Haenszel that the observed differences between opiate and barbiturate administration to cases and controls are due to a confounding influence from hospital and year; even if these are taken into consideration differences are still highly significant (P <0.001).

Table 2

Six fourfold tables for Chi-square tests of differences between high and low risk victim categories regarding asphyxia, mechanical trauma involving the head and traction of the neck, and administration of opiates and barbiturates. (From Jacobson et. al.[1] by permission Munksgaard International Publishers Ltd.)

Occurrence of Perinatal Risk Factors	*High Risk Category Number Cases*	*Low Risk Category Number Cases*	*Chi sq*	*P*
	Hanging and strangulation + drowning + poisoning by gas	Poisoning by solid and liquid substance		
No asphyxia	83 + 11 + 18 = 112	86		
Asphyxia	5 + 4 + 2 = 11	0	6.4	0.01
	Hanging etc. + drowning + poisoning by gas	Poisoning by solid etc. + alcoholics		
No asphyxia	83 + 11 + 18 = 112	86 + 53 = 139		
Asphyxia	5 + 4 + 2 = 11	0 + 0 = 0	10.9	0.001
	Hanging etc + other mechanical injuries	Poisoning by solid etc. + drowning + poisoning by gas		
No trauma	72 + 45 = 117	83 + 13 + 18 = 114		
Breech presentation + forceps delivery + multiple nuchal loops	16 + 9 = 25	3 + 2 + 2 = 7	7.5	0.01
	Drug addicts	All suicides*		
No opiates or barbiturates	73	80 + 18 + 12 + 75 + 48 = 233		
Opiates and/or barbiturates	23	6 + 2 + 3 + 11 + 6 = 28	9.0	0.01
	Drug addicts	Poisoning by solid etc.		
No opiates or barbiturates	73	80		
Opiates and/or barbiturates	23	6	8.5	0.01
	Drug addicts	Alcoholics		
No opiates or barbiturates	73	47		
Opiates and/or barbiturates	23	6	2.7	0.1

*Poisoning by solid and liquid substance (n = 86); poisoning by gas (n = 20; drowning (n = 15); hanging and strangulation (n = 86 excluding 2 drug addicts); and other mechanical injuries (n = 54).

Since the desirable mood of an addict may be a sedated state as compared to a wish for death for the suicide victim, a comparison is warranted between the addicts and all suicides regarding opiate and/or barbiturate administration-the difference is significant (P = 0.01), Table 2. This is also the case if the comparison is done with the subcategory of suicides choosing poisoning by solid or liquid substance (P = 0.01), Table 2. A corresponding comparison with the alcoholics does not yield a significant difference, (P = 0.1). The administration of nitrous oxide analgesia and'chloroform anesthesia has also been considered. No category showed a positive correlation with the duration of administration of nitrous oxide. The mothers of the alcoholics had obtained chloroform anesthesia more often than controls (P = 0.01). Mothers of the drug addicts administered chloroform (N = 33), 93.9% had obtained ≥5 g (controls 72.7%, P = 0.002). Impairment of imprinting by drugs. From imprinting experiments in animals it is known that certain sedative and anesthetizing drugs impair the imprinting process. Hence, it is conceivable that such drugs administered during delivery would impair imprinting also in infants. This could only be demonstrated in man by observing a negative effect of drugs-imprinting by other stimuli such as mechanical trauma would be more common for infants of mothers having received less than average sedative or anesthetizing drugs. Hence, it is meaningful to test for a negative correlation between administered drugs and self-destructive behavior in offspring of other types than those drugs presumably can cause, such as violent suicides. It is, however, not meaningful to test whether mothers of victims choosing suicides by asphyxiation, since anesthetizing drugs in themselves might cause some asphyxia through depression of the respiratory center in the brain. Furthermore, during the 1940's and 1950's pure nitrous oxide was administered without the addition of oxygen. The mothers of victims committing suicide by violent means had been given nitrous oxide less often than to controls (48.0 and 53.6%, respectively, N.S.). The difference was greater for administration of chloroform to these mothers (27.6 and 37.6%, respectively, P = 0.05). The results make it impossible to reject the imprinting hypothesis. It accounts for all observed effects in

the forensic case study. AMPHETAMINE ADDICT STUDY The study on forensic victims was criticized on the grounds that it did not take socio-economic factors into account. Hence, a new study is presently being undertaken.2 Sofar birth records have been gathered for 99 amphetamine addicts, who were arrested in Stockholm late 1986 and early 1987. The criteria for addiction were scars from injection needles, as well as documented criminal behavior related to a drug offense. Furthermore the addicts were interviewed regarding preference for type of drug, birth hospital and number and age of siblings. Karin Nyberg is studying the social class of the parents at time of birth for the addicts. The social class is determined from father's profession, or for an unmarried woman from her profession, according to a system used by the Central Bureau of Statistics in Sweden. The average class of parents of 99 eventual addicts was higher than the mean for Sweden during the birth period for the addicts. The difference is not, however, significant. By comparing the birth records of the 99 addicts with 133 siblings it is possible to control for social class in studying associations with obstetric pain medication. The most obvious difference so far observed for addicts and siblings is the high incidence of pain medication with multiple types of drugs among the addicts, 18.2% (siblings 7.6%, $P < 0.05$). Consequently, the amphetamine addict study excludes that socioeconomic conditions cause the addiction. DISCUSSION The proposed mechanism hypothesis has the advantage that it alone suffices to explain all observed associations. Imprinting is a fundamental ethological mechanism and compulsive repetition a fundamental psychodynamic mechanism. Self-destructive behavior seems to be caused by an imprinting process at birth creating an unconscious need to repeat a traumatic experience at birth as an adult. It should not be surprising that human infants are susceptible to imprinting. For many species in all classes-insects, fishes, reptiles and mammals-this mechanism has been of paramount importance for survival. Rather it would be more surprising if nature had removed the imprinting process in the human species during the comparatively short evolutionary period during which the human intellect made the mechanism unnecessary. It is evident that the eliciting trauma, whatever its nature, can be very light. A mere traction in an entangled cord might be enough. The mechanism must be due to an utterly enhanced receptivity during the early period in life. The notion that a traumatic birth is of importance for suicide proneness is not new. The psychoanalyst Otto Rank proposes this in his book 'The trauma of birth' published in 1929.3 Several others during the 1970's have expressed similar thoughts. But these claims were never supported by any statistical data. The first statistical study seems to be the one recently published by Salk, Lipsitt, Sturner, Reilly and Levatt.4 They found an increased rate of several perinatal risk factors among 46 tested variables for adolescent suicide victims. Particularly, two maternal factors and respiratory distress for more than one hour at birth were found to differentiate suicides from controls. They suggest that the increasing rates of adolescent suicides in the United States are due to a decline in infant mortality rates during the last decades as a result of aggressive efforts of resuscitation, and to that infants who survived adverse perinatal conditions would be more vulnerable to environmental conditions eliciting suicide. The results presented here may suggest a somewhat different interpretation. In view of the variations in distributions of births among the hospitals, and of the similarities between perinatal risk factors and types of adult behavior, it seems more likely varying obstetric procedures caused iatrogenic injuries leading to eventual self-destructive tendencies. Also, it seems possible that the high rates of drug addiction and suicide among young cohorts in several countries58 are due to more active obstetric procedures during the last few decades. The results involving low frequencies of pain medication to mothers of eventual victims committing suicide by violent means should not be taken as an indication of that drugs impair imprinting of the fetus in a beneficial way. First, the level of statistical significance is low, and the effect has to be confirmed in a new study. second, if the results can be reproduced and the effect exists, it cannot be considered ethical to increase the likelihood of imprinting many infants to become eventual drug addicts to prevent a few from becoming prone to suicide by violent means; drug addiction in no way protects an individual from committing suicide. CONCLUSION Obstetric procedures should be carefully evaluated and modified so as to prevent eventual self-destructive behavior in offspring. References REFERENCES 1. Jacobson, B., Eklund, G., Hamberger, L., Linnarsson, D., Sedvall, G, &Valverius, M. (1987).

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