Month of Conception and Birth of Schizophrenics as Related to theTemperature

Donald I. Tempter, Ph.D., [1] Carol F. Ruff, M.A.,[2] Paula H. Halcomb, M.S., [3] Victoria L BarthJow, B.A., 4 and Joyce L. Ayers, M.A. 5

By the use of both data compiled by the present investigators and that reported in previous studies, a rather consistent trend of schizophrenics being born in cold months and conceived in warm months is apparent. The negative birth-temperature correlations tend to be greater in localities with colder winters. The positive conception correlations tend to be greater in localities with cooler summers. The conception-temperature correlations, and to a lesser extent the birth-temperature correlations, were generally larger in European than in American localities. It was contended that the harmful influence and genetic morphism theories were supported more by the data presented in this study than the parental procreational trend position.

' Clinical Psychologist, Fresno Campus, California School of Professional Psychology, 1350 M Street, Fresno, California, 93721.

*** Chief Psychologist, Western State Hospital, Hopkinsville, Kentucky, 42240.**

3 Staff Psychologist, Western State Hospital, Hopkinsville, Kentucky, 42240.

[4] Psychological Assistant, Western State Hospital, Hopkinsville, Kentucky, 42240.

5 Staff Psychologist, Western State Hospital, Hopkinsville, Kentucky, 42240.

The purposes of the present project were to determine the number of conceptions and births as a function of season of the year, and to determine the correlations between mean monthly temperature and number of schizophrenic conceptions and births.

Barry and Barry (1961) reviewed and presented the results of six studies that examined the number of births of schizophrenics for each of the 12 months-corrected for number of days per month. The findings of these studies converge to the generalization that schizophrenics tend to have a birth date in the first four calendar months and tend not to have a birth date in the middle four months. However, McNeil et al. (1971) contended that time of conception is more relevant than time of birth. They reported a significant trend for conceptions to occur in the hot (June, July, and August) months, but time of birth was not significantly related to number of births of seriously disturbed (schizophrenic and autistic) children.

The present study was intended to clarify the apparent discrepancy between the results of McNeil et al. (1971) and those of

ORTHOMOLECULAR PSYCHIATRY, VOLUME 7, NUMBER 4, 1978, Pp. 231 - 235

other researchers. In addition to grouping months as in previous research, the current investigation determined the correlation between mean temperature of month and number of conceptions and births. All of the previous researchers, regardless of their interpretation of results, have stated or implied that temperature was somehow a relevant variable.

METHOD

The current investigation involved new data collection in addition to the month-by-month tabulation in the Barry and Barry (1961) review and subsequent articles that included such tabulation. The new data consisted of dates of birth of 574 schizophrenics at Western State Hospital. The temperatures employed were the official average Fahrenheit recordings of Louisville—January 33.3, February 35.8, March 44.0, April 55.9, May 64.8, June 73.3, July 76.9, August 75.9, September 69.1, October 57.9, November 45.0, and December 35.9. Louisville seemed an appropriate location since the preponderance of the Hospital patients are native Kentuckians, and since all of the previous studies were in the Northern Hemisphere (North America and Europe) with temperatures admittedly varying considerably, but with monthly temperature rankings of small variation. Time of conception was assumed as nine months before birth.

For both the present data and that reported by previous investigators, and for both the correlations and chi squares, calculations were made on the basis of chance expectation comparisons since, according to Table 1 of Barry and Barry (1961), distribution of births with normal individuals differs very little from chance. Also, corrections were made for the different numbers of days per month.

TABLE 1
Number of Schizophrenic Conceptions and Births as Function of Time of Year

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept	Oct	Nov.	Dec.
Conceptions	49	38	40	60	62	55	47	45	42	55	35	46
Births	60	62	55	47	45	42	55	35	46	49	38	40
Seasons of Year	Cold		Other			Hot			Other			Cold
Thirds of Year	First Third				Middle Third				Last Third			

RESULTS AND DISCUSSION

Table 1 presents the number of schizophrenic births and conceptions categorized hot—cold—other as in the McNeil et al. (1971) study and by the first, middle, and last thirds of the year. With the hot—cold—other categorization, $x2 = .68$ for conceptions and $x2 = 4.28$ ($p < .20$) for birth. With the thirds of year categorization, $x2 = 2.37$ for conception and $x2 = 9.02$ ($p < .02$) for birth. The rank order correlation coefficient between temperature and conception is .18, and the correlation between temperature and birth is -.36. Thus for our Kentucky patients, birth appears to be a more important variable than conception. However, it should be borne in mind that the Kentucky findings have only a small role in regard to the composite picture obtained from its inclusion with the 12 other studies.

Table 2 displays the rank order correlation coefficients of both conception and birth with temperature for all 13 located studies with month-by-month tabulations. It is apparent that the conception correlations are positive and the birth correlations predominantly negative, and that neither the conception nor the birth correlations taken as a whole are of clearly greater magnitude than the other. Also, since the positive conception correlations could be attributed to cold weather births and negative birth correlations to hot weather conceptions, it is certainly not immediately evident from the correlations whether con-

TABLE 2

Rank Order Correlation Coefficients of Temperature with Birth and Conception

Author	Location	F° Jan.	F° July	Conception Rho	Birth Rho
Tramer (1929)	Switzerland	31	65	.57*	−.53*
Lang (1931)	Bavaria	28	63	.55*	−.47
de Sauvage Nolting (1934)	Netherlands	30	63	.25	−.83***
Petersen (1934)	Illinois	25	75	.39	−.53*
Huntington (1938)	Ind., Md., Mich., Mass., Minn., N.Y., Ohio, Penn.	28	75	.11	−.76**
Barry (1949)	Mass. and N.Y.	31	75	.05	−.42
Barry and Barry (1964)	Connecticut	27	74	.59**	.10
McNeil et al. (1971)	Calif., N.Y., Tenn., Texas	44	76	.29	.13
Norris and Chowning (1962)	Canada	15	70	.62**	−.44
Hare et al. (1974)	England and Wales	39	63	.67**	−.27
Odegard (1974)	Norway	25	65	.71**	−.40
Hare and Price (1969)	England and Wales	39	63	.66**	−.51*
Present study	Kentucky	33	77	.25	−.34

*$p < .10$
**$p < .05$
***$p < .01$

ception or birth is more related to the more crucial variables. However, a reasonable assumption is that if temperature is important the positive conception correlations would be higher in localities with warmer summers and/or the negative birth correlations would be in localities with colder winters.

In order to make such a determination, the average January and July temperatures were obtained from encyclopedic sources. The temperatures for the largest city in the country, district, or state were employed. For the studies which included more than one state the mean of the largest cities in the states was employed. Table 2 contains the January and July Fahrenheit temperature for each study. It is obvious that since our temperature determination was rough and arbitrary, the one or two degree Fahrenheit differences between localities in Table 2 are of doubtful validity. However, grouping into the warmer and cooler localities would appear to provide a more reasonable differentiation. Six of the seven localities with at or above median conception correlations have July temperatures of or below the median; and one of the six localities with below median conception correlations has a median or below July temperature ($x2 = 6.90$, $p < .01$). Six of the seven localities with birth correlations at or above the median (in a negative direction) have at or below median January temperatures; and two of the six localities with below median birth correlations have below median January temperatures ($x2 = 3.78$, $p < .06$). The association of colder January temperatures with higher negative temperature-birth correlations is consistent with the position that cold winters are in some crucial way associated with an excess of schizophrenic births. However, the association of cooler July temperatures with positive temperature-conception correlations is the opposite of what would be predictable if hot summers are in some crucial way associated with an excess of schizophrenic births. Furthermore, this cannot be adequately explained on the basis of the correlation between July and January temperatures (rho = -.04), or that between the conception correlations ranked in terms of positive descending order and the birth correlations ranked in terms of negative descending order (rho = -.26). However, the negative association of the conception-temperature correlations with temperature of localities could possibly be understood in connection with the American July temperatures being warmer than the European July temperatures. In fact, there was no

overlap. The Canadian July temperature was intermediate between those of the American and European July temperatures. The American conception correlations tend to have a lower rank than those of the other countries ($U = 3$, $p = .004$). If Canada is grouped with the United States, the North American correlations also tend to be lower ($U = 9$, $p = .051$). The birth correlations (ranked in order of descending magnitude) are also higher in the other countries with $U = 13.5$ ($p<.17$) for either placement of Canada.

There are two general types of explanations frequently reported by previous authors regarding the time of year of schizophrenic births and conceptions. One is the "harmful influence" (McNeil et al., 1971) position that maintains some sort, usually biological, of unfavorable conditions or events promote the development of schizophrenia. The other is that parents of schizophrenics are more likely to conceive in the spring. Hare and Price (1969) and McNeil et al. (1971) provided lucid descriptions of explanations encompassed under these two general viewpoints. A third explanation entertained by Hare and Price (1969) centers around the contention of Huxley et al. (1964) who maintained that schizophrenia is a genetic morphism. They said that schizophrenia is based upon a single dominant gene with 25 percent penetrance. They reasoned that since the fertility of schizophrenics is 70 percent that of socioeconomically comparable normals, 'The incidence of the disease would therefore be rapidly reduced to the level where it is maintained by mutation alone, unless its selective disadvantages of lower viability and fertility were compensated by some selective advantage." They postulated that schizophrenics have several physiological advantages including resistance to infection.

The harmful influence proponents maintain influences in the winter and/or summer bring about brain and/or other defects near conception that increase the probability of schizophrenia. The harmful influence position would appear to have merit in view of the fact that an excess of mental retardates are also born in winter months and conceived in summer months (Knobloch and Pasamanick, 1958).

Explanations involving procreational patterns of parents of schizophrenics usually concern social class. However, even though it has been long known that schizophrenics tend to be of below-average socioeconomic status, evidence indicates that parents of schizophrenics do not differ in social class from the general population (Dunham, 1964; Goldberg and Morrison, 1963; Hare et al., 1972). Furthermore, in some of the studies listed in Table 2 schizophrenics were differentiated from lower class normal persons. There is also evidence that religion and occupation are not relevant variables (0degard, 1974; Hare and Price, 1969). And the proponents of the procreational patterns-low social class position stress summer conceptions. Yet, there appears to be little reason for such a social class-based pattern to be stronger in those localities with cooler summers.

The genetic morphism position is able to incorporate the negative birth-temperature correlations since schizophrenics seem to have more resistance against respiratory infection—which cold weather infants are ordinarily more vulnerable to. A genetic morphism explanation can also account, at least for birth and possibly for conception, for the fact that the correlations are higher for European countries than for the United States. The generally greater prosperity with associated central heating and other greater protections from the elements over the last century in the United States could favor the survival of more nonschizophrenics and thereby make temperature a less differentiating variable than in Europe.

CONCLUSION

Schizophrenics tend to be conceived in warm weather and to be born in cold weather. These tendencies are more pronounced in European countries than in the United States and in colder than in warmer weather climates. Harmful influence, procreational trends of parents of schizophrenics, and genetic morphism ex-

planations are three (not mutually exclusive) possibilities that we believe can neither be ruled out nor given overwhelming support by the data at our disposal. However, it is our opinion that the harmful influence and genetic morphism theories are supported more by the evidence here presented than the procreational trends of parents of schizophrenics position.

REFERENCES

BARRY, H., Jr.: Significance of Maternal Bereavement Before Age of Eight in Psychiatric Patients. Archives of Neurological Psychiatry 62, 630,1949.

BARRY, H., and BARRY, H.: Season of Birth: an epidemiological study in psychiatry. Archives of General Psychiatry 5,292-300,1961.

BARRY, H. Ill, and BARRY, H., Jr.: Season of Birth in Schizophrenics. Archives of General Psychiatry 11,385-391,1964.

de SAUVAGE NOLTING, W.J.J.: Het Verband Tusschen Schizophrenic en Aanverwante Ziektebeelden en de Geboortemaand. Ned. T. Geneesk 78,528-530,1934.

DUNHAM, H. W.: Social Class and Schizophrenia. American Journal of Orthopsychiatry 34,634-642,1964.

GOLDBERG, E. M., and MORRISON, S. L: Schizophrenia and Social Class. British Journal of Psychiatry 109,785-802,1963.

HARE, E. H., and PRICE, J. S.: Mental Disorder and Season of Birth: Comparison of Psychosis with Neurosis. British JournalfiDf Psychiatry 115,533-540,1969.

HARE, E. H., PRICE, J. S., and SLATER, E.: Mental Disorder and Season of Birth. British Journal of Psychiatry 124,81 -86,1974.

HARE, E. H., PRICE, J. S., and SLATER, E.: Parental Social Class in Psychiatric Patients. British Journal of Psychiatry 121,515-524,1972.

HUNTINGTON, E.: Season of Birth: Its Relation to Human Abilities. New York, John Wiley and Sons, Inc., 1938.

HUXLEY, J., MAYR, E., OSMOND, H., and HOFFER, A.: Schizophrenia as a Genetic Morphism. Nature 204,220-224,1964.

KNOBLOCH, H., and PASAMANICK, B.: Season Variation in the Births of the Mentally Deficient American Journal of Public Health 48, 1201-1208,1958.

LANG, T.: Zur Frage Geisteskrankhert and Geburtesmonat Archives RasservBiologie 25,42,1931.

McNEIL, T. F., RAFF, C. S., and CROMWELL, R. L: Technique for comparing the relative importance of season of conception and season of birth, British Journal of Psychiatry 118,329-335,1971.

NORRIS, A. S., and CHOWNING, J. R.: Season of Birth and Mental Illness. Archives of General Psychiatry 7,206-212,1962.

ODEGARD, O.: Season of Birth in the General Population and in Patients with Mental Disorder in Norway. British Journal of Psychiatry 125, 397-405,1974.

PETERSEN, W. F.: The Patient and the Weather. Mental and Nervous Diseases, Vol. 3. Ann Arbor, Michigan, Edwards Bros., Inc., 1934.

TRAMER, M.: Uber die biologische Bedeutung des Geburtsmonates, imsbesodere fur die Psychoseerkrankung, Schweiz. Archives of Neurological Psychiatry 34,17-24,1929.