Schizophrenia, Latitude and Temperature

Donald I. Templer, Ph.D., Julie Hintze, M.A., Neal H. Trent, M.S.[1]
Ann Trent, M.A.[2]

Abstract

Countries with higher schizophrenia rates were found to have lower January temperature, lower July temperature, higher geographical latitude, and higher per capita income. The findings were related to previous research on the epidemiology of schizophrenia.

This research was conducted in the context of a series of studies that determined the geographical distribution similarities of schizophrenia and multiple sclerosis (Templer, Regier & Corgiat, 1985; Templer, Cappelletty & Kauffman, 1989; Templer, Hughey, Chalgujian, Lavoie, Trent, Sahwell & Spencer, 1990). The findings of the last cited study form most of the empirical rationale for the present research. Correlations of .77, .81, and .84 were reported between latitude and three measures of multiple sclerosis for the states of the U.S.A. (Limburg, 1950; Kurtzke, Beebe & Norman, 1979; Kurtzke, 1978). The respective correlations were -.65, -.56, and -.60 for January mean low temperature and -.65, -.64, and -.69 for July mean high temperature (all p's < .001). For the 17 districts of Italy, the latitude correlation of .43 was only of marginal significance, and neither the January nor the July temperature approached significance. The high correlations discovered between latitude and multiple sclerosis should be regarded as confirmatory rather than a completely new discovery. This is because the greater incidence of multiple sclerosis with greater distance north of and south of the equator has long been almost common knowledge in the literature on M.S., even though the magnitude of the association has never been quantified (McAlpine, Lumsden & Acheson, 1972).

1. California School of Professional Psychology, 1350 M Street, Fresno, CA 93721.

2. California State University, Fresno, CA.

For schizophrenia, neither the findings of the Templer et al (1990) study nor the previous literature provide a definitive perspective with respect to the association of this disorder with latitude and temperature. Torrey (1979) stated that schizophrenia is more common in northern than in southern Europe, and more common in the northern than southern states of the U.S.A., but did not provide supporting quantification. In the Templer et al (1990) study, schizophrenia was not significantly correlated with January or July temperature for either Italy or the United States. Latitude was not significantly correlated with schizophrenia in the United States, but was correlated ($r = .54$, $p < .05$) in Italy. Thus for the nine temperature and latitude correlations with schizophrenia only one was significant. In the present research, the latitude and temperature correlations with schizophrenia rates were determined using data from 25 countries (Scheper-Hughes, 1979). It was not the original intention to include per capita income, but visual inspection of the schizophrenia rates revealed that the wealthier countries had higher schizophrenia rates. It was the intention to use as many sets of schizophrenia rates as possible, but no others could be found.

Methods

Scheper-Huges (1979) provided a table of psychiatric hospitalization rates for a group of 20 countries in 1955 and for a group of 25 countries in 1965. The countries that comprise the latter, in descending order are Republic of Ireland, Sweden, Austria, New Zealand, Israel, Scotland, Northern Ireland, England and Wales, United States, Canada, Poland, Italy, Chile, Ceylon, Spain, Japan, Cyprus, Greece, Portugal, Brazil, Ghana, Mexico, Kenya, Senegal, and Nigeria. These countries had rates quite similar in 1955 but did not include rates for Chile, Greece, Kenya,

Mexico, and Senegal. Temperature, latitude and per capita income data were obtained from encyclopedic sources.

Results

Table 1 shows the product-moment correlations of both 1955 schizophrenia and 1965 schizophrenia with latitude, January mean low temperature, July mean high temperature, and per capita income. It is apparent that all of the independent variables were significantly related to both indices of schizophrenia.

It was decided to do partial correlations with per capita income controlled for since temperature and latitude were viewed as the theoretically more important variables of this study. These partial correlations are contained in Table 1. It is apparent that latitude and July temperature remained significantly correlated with schizophrenia rate but January temperature did not.

Discussion

The schizophrenia correlations with latitude and temperature are consistent with the strong and accumulating evidence that schizophrenia is very much of a disorder with an epidemiology (Torrey, 1979). It is also consistent with the above reviewed research showing epidemiological similarities with multiple sclerosis. The latter disorder is more common in colder climates and with increasing distance from the equator. Multiple sclerosis is also more common in the more prosperous countries of the world.

The negative correlations of temperature with both schizophrenia and M.S. mesh with the contention of some authors that some sort of infectious process could cause M.S. It is also consistent with the contention of some authors that some sort of infectious process could cause schizophrenia. Templer et al (1990) inferred from the findings of their study that "Perhaps the most omnibus generalization permitted by the present findings is that schizophrenia and multiple sclerosis both seem to be associated with geographical variables that at least folklore has traditionally regarded as unhealthy. The unhealthy variables associated with high multiple sclerosis rates include colder temperatures, closer to the hemispheric poles, more precipitation, low elevation, and less sunlight. Infection and nutrition are two of the possible etiological variables that could account for this pattern."

The positive association of prosperity with schizophrenia and M.S. rates in an international perspective might seem inconsistent with an infection explanation. However, it has been suggested by Pos-kanzer, Schapira, and Muller (1963) that M.S. may be, like polio, less common in underdeveloped countries with low sanitation standards, because of immunity from relatively asymptomatic infection very early in life.

The positive correlation of schizophrenia and per capita income on an international level may seem inconsistent with the fact that *within* "Western" countries such as the United States lower SES persons have a higher rate of schizophrenia. However, one must bear in mind that lower income persons in developed countries do not experience the same kind of sanitation conditions common in some less developed countries. Furthermore, some evidence supports the "drift hypothesis", that schizophrenics fall to a lower SES level *after* onset of schizophrenia.

It is difficult to say whether the partial correlations with per capita income controlled for bring more clarification and consolidation or whether they raise more questions than they answer insofar as January temperature is no longer significant. One might have predicted that if lower temperature is an important variable winter temperature would be more important than summer temperature. However, the present findings could be viewed as consistent with the research of Foster (1988) in which there was found a negative correlation between sunlight and multiple sclerosis, and the research of Templer et al (1990) that found inverse correlations of sunlight with both multiple sclerosis and schizophrenia. Perhaps amount of summer sunshine or temperature is more critical than amount of winter sunshine or temperature in colder climates for preventing harmful infections or nutritional or soil constituent processes.

Much of the above discussion is admittedly quite speculative. However, the find-

ings of the present study do constitute strong and confirmatory evidence that schizophrenia has an epidemiology, and that this epidemiology has similarities to that of multiple sclerosis.

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Table 1 Correlations of Schizophrenia Rates with Latitude, Temperature & Per Capita Income

Schizophrenia Rates	Latitude	January Temperature	July Temperature	Income
1955 (20 countries)	.69***	-.52**	-.64***	.57**
1965 (25 countries)	.68***	-.54**	-.60***	.66***
Partial correlations with income controlled for				
1955 (20 countries)	.54**	-.25	-.68***	
1965 (25 countries)	.45*	-.21	-.42*	

*p < .05 **p < .01 ***p < .001