National Motives Predict Psychogenic Death Rates 25 Years Later

Abstract. *Achievement motivation scores derived from analyses of content of children's stories from 16 countries predicted death rates due to ulcers and hypertension, and power motivation scores predicted death rates due to murder, suicide, and cirrhosis of the liver 25 years later.*

McClelland and his colleagues (see *1*) have found a number of significant positive correlations between the motive for achievement (referred to as "need for achievement" and defined as the motive to excel in comparison with some abstract standard of excellence at the performance of some task) in a nation and its actual performance in economic productivity. This motive is measured by content analysis of imaginative literature; the criteria of economic productivity have varied. Several studies have been done on past and present societies; the results of all are in essential agreement. The reliability and validity of this method for predicting the behavior of individuals and small groups have been demonstrated elsewhere (*1, 2*).

The purpose of this study was to investigate the possibility that the need for achievement might produce undesirable psychological effects in a society as well as desirable ones, and to study the effects of other motives prevalent in a society in relation to criteria of mental health or psychological disorder (hereafter referred to as psychomorbidity).

In one of McClelland's studies (*1*), children's books of stories from about the year 1925 from 22 nations—all relatively modern, Western or Westernized, and within the temperate zone so as to control for extremes of climate and poverty—were content analyzed and each country assigned a score on the need for achievement. The stories were those selected for use in schools for children to practice reading. Children's stories were chosen for these reasons: (i) previous research on primitive tribes had shown significant relationships between contents of myths and actual achieving behavior; children's stories, many of which derive from an oral tradition, seem to be an approximation of myths and legends in advanced civilizations, (ii) they usually have existed in rather standard form for at least a generation, (iii) they are imaginative and aim both to interest and instruct the child, (iv) they are usually not restricted to one social class and hence reflect the "popular culture" of the day, (v) they are not likely to reflect transient external events since children are not usually considered old enough to care about such things, (vi) they were available, and (vii), as Margaret Mead is reputed to have said, "A society must get its values over to its children in terms so simple even a social scientist can understand them" (*1*, pp. 70–71). While undoubtedly children learn values directly from the readers themselves to some extent, it is assumed here only that these reading books reflect the motives and values of the society at that time. Two measures of economic growth from 1929 to 1950 were obtained by using the relative increase in production of electricity per capita and the relative increase in national income per capita. The 1925 need-for-achievement scores predicted the increase in electricity output per capita significantly better than chance (rho = .53, $P < .01$) and the correlation with per capita income gain was in the right direction although not significant (rho = .25) (*3*).

There is a general belief among psychologists, however, that hard-driving achievers are likely to suffer from psychogenic ailments such as neuroses, ulcers, and hypertension; while derived originally from clinical observations, there is strong experimental support for such assumptions (*4*). McClelland's scores from 1925 were therefore related to several indices of psychomorbidity from about 1950 to 1953. The year 1950 was chosen for several reasons. (i) McClelland and his co-workers had found national motive scores to predict economic productivity in modern societies over about a 25-year time span; hence, I inferred that whatever social psychological processes were at work affecting that behavior would also affect the behavior I was interested in. (ii) Social scientists generally regard about a 30-year time period as constituting a "generation"; that is, if a whole generation of children are taught certain motives and values, then the behavioral manifestations of them will be most numerous when that generation of children has reached maturity and are actually running the society. In this case, the stories were mainly for children about 10 to 15 years of age; 25 years later, at ages 35 to 40, they might reasonably be expected to be acting out their values and setting the trend of the whole society at that time. (iii) By their late 30's people are physically weak enough to begin dying off of psychogenic ailments, yet are not so old that degenerative diseases play a significant role in causes of death.

As measures of psychomorbidity, death rates probably due largely or substantially to psychological factors were selected. Although other indices might appear more directly relevant, such as admissions to mental hospitals per capita, such data either do not exist for all countries, are not readily accessible, or might vary greatly in meaning from one country to the next. Thus, in one country sparsity of population and a rural economy would permit mild chronic psychotics to exist marginally, whereas they could not in an industrialized nation of high population density. Also, national methods of diagnosis and definitions of categories used in gathering such statistics are not always comparable.

The United Nations has since about 1948 compiled death rates according to International Statistical Classification from the published reports of many member states. The *Demographic Yearbook* for 1954 (*5*) was therefore consulted. Five cause-of-death categories were selected that seemed to have psychological factors as the primary or underlying causes: murder, suicide, alcoholism (as measured by deaths due to cirrhosis of the liver), ulcers, and hypertension (high blood pressure) without mention of heart disease. While some deaths due to cirrhosis of the liver are certainly not due to alcoholism, and some deaths due to ulcers and hypertension are probably due to as-yet unknown genetic and other factors, I assumed either that these factors would remain relatively constant from one country to the next and that the component due to psychological factors would contribute the major part of the variance, or that they would be unrelated to the psychological causes.

Of McClelland's original 22 countries studied, causes-of-death data were available for 17, and motivational scores for the year 1925 were to be had for only

Table 1. Correlations (rho) among psychogenic death rates, about the year 1950. N (number of countries) = 17.

Cause of death	Suicide	Cirrhosis of the liver	Ulcers	Hypertension
Homicide	.44	.40	−.10	−.25
Suicide		.49	.19	−.36
Cirrhosis of the liver			−.30	−.28
Ulcers				.54

16 of these countries. Death rate scores were obtained by following three rules: (i) if the rate for only one year is given, use it; (ii) if the rates for two or more years are given, use the average; and (iii) no figures labeled "provisional" shall be used. The next problem was to determine whether these were all separate measures of psychomorbidity, or whether some common factors ran through them. All five measures were therefore correlated with one another, and the resultant intercorrelations, shown in Table 1, demonstrate that the data fall neatly into two clusters: murder, suicide, and alcoholism correlate highly with one another, while ulcers and hypertension do not correlate with the three preceding measures (in fact, there is a tendency toward small negative correlations) but do correlate highly and significantly with each other ($P < .02$). To cross-validate, the death rates for about 1960 (*6*) were obtained in the same way and the intercorrelations were calculated. There were minor and insignificant changes in the pattern of intercorrelations. In view of the small number of countries studied and the clarity of the results, a factor analysis was deemed superfluous.

The cluster comprising murder, suicide, and alcoholism was termed "deaths due to aggressiveness and acting-out," with aggressiveness here very broadly defined as a tendency to act out emotional impulses and to take an active, manipulative approach toward the world. Deaths in the other cluster, comprising those due to ulcers and hypertension without mention of heart disease, were labeled "deaths due to inhibition."

McClelland (*1*) has also provided data on the 1925 motivational scores of 16 of these countries (all except Switzerland) for a need or motive besides that of achievement, namely the need for power, defined as the desire to dominate others, to influence others, to have a decision-making position over others, or the desire to direct the behavior of others.

Two hypotheses were then formulated on the basis of the above interpretation of the death rate clusters and the definitions of the need for achievement and the need for power: (i) the need for achievement in 1925 will correlate positively with the 1950 death rate cluster due to inhibition, but will not be correlated with the death rate cluster due to aggressiveness; and (ii) the need for power in 1925 will correlate positively with the 1950 death rate cluster due to aggressiveness, but will not be correlated with the death rate cluster due to inhibition. Death-rate-cluster scores were obtained by ranking the countries studied on each death rate, summing ranks within a cluster, and re-ranking the summed ranks.

The results are shown in Table 2. Both hypotheses are regarded as confirmed, the rho of .66 between the need for achievement and deaths due to inhibition being significant beyond the .01 point (one-tailed test); and, although the correlation between the 1925 need for power and the 1950 death rate cluster due to aggressiveness (rho = .42) just misses the required rho of .425 to be significant at the .05 level (one-tailed test), it is deemed high enough to confirm the hypothesis, especially since the correlation with suicide alone was .51, with $P < .05$.

The logic of "construct validity" as elaborated by Cronbach and Meehl (*7*) is used here. Since I inferred previously that suicide, murder, and alcoholism constitute a cluster called "deaths due to acting-out or aggressiveness," I can go one step further and assume that each separate death rate of the cluster is simply one manifestation of a generalized behavioral tendency, the separate death rates being influenced at times by local conditions. Now I can argue that one death rate is only one sample behavior of the cluster, just as one item is merely one sample of what is tested on an intelligence test. Admittedly, this train of thought is tenuous and opens the door to unrestricted speculation. It can, however, be held in check if other behavioral tendencies which look as if they should correlate with those in the construct on theoretical grounds do so. As will be discussed below, evidence of this nature is available for the inhibition death rate cluster; to date, however, the only evidence bolstering the construct validity of the aggressiveness cluster is a significant correlation between the 1950 aggressiveness death rate cluster and the 1950 divorce rate. This correlation is reasonable, since people who are aggressive should have difficulty living with one another. Since divorce rate was not selected in advance, and its correlation predicted, however, it is admittedly a weak buttress and requires future validation.

Table 2. Correlations (rho) between 1925 motives and 1950 death rate clusters, death rates, and other behavior. N (number of countries) = 16.

Behavior	Motive	
	Need for achievement	Need for power
Aggressiveness cluster	−.11	.42
Murder	.03	.22
Suicide	−.09	.52
Cirrhosis of liver	−.31	.13
Inhibition cluster	.66	−.02
Ulcers	.57	.20
Hypertension	.52	−.18
Film attendance*	.55	−.05
Books published*	−.48	.02

*$N = 15$; see text.

The construct validity of the inhibition cluster obtains support from two other correlations. After a hard day achieving, the resident of a country high in the need for achievement will probably seek escape and eschew recreation demanding some intellectual effort. The number of books produced per capita and attendance at motion pictures per capita were therefore calculated from data from about 1955–1958 furnished in another United Nations publication (*8*). As can be seen in Table 2, the results were as hypothesized: the 1925 need-for-achievement scores correlated (rho) −.48, with $P < .05$ (one-tailed test) with books produced per capita about 1955–1958, and (rho) .55, $P < .05$, with per capita attendance at films over the period about 1955–1958, the only years for which data were available. This was, of course, before television was widely in use. It is interesting to note that the United States is one of the nations highest on both the aggressiveness cluster and the inhibition cluster, one of the lowest on book production, and one of the highest on film attendance.

Aside from demonstrating that a high need for achievement is not the unmixed blessing it might be assumed to be, these results help clarify the meaning of the two scores. I interpret the need for achievement as a tendency to postpone immediate gratification to attain greater future gratification, to inhibit emotional impulses, and generally to maintain a "Protestant ethic" with emphasis on hard work, sobriety, and concrete results. While detracting somewhat from his inference that a society high in the need for achievement is most fortunate, these results generally support and strengthen McClelland's overall interpretation of the need-for-achievement score.

The need for power is seen as correlated with the acting out of impulses and with a manipulative, aggressive attitude toward other people. I infer also a loss of humane values and a willingness to engage in violence (as exemplified in murder and suicide). Possibly the high alcoholism rate reflects a high anxiety level in countries high in the need for power.

A weakness of this study is its failure to correlate the 1925 motivation scores with death-rate-cluster scores for more years, say from 1926 to 1980. The only data I can offer are correlations of the 1925 motivation scores with 1960 death rate clusters; they were slightly lower and insignificant, but only barely. The problem is that not enough time has elapsed, nor is enough data available, to fill in the gaps. McClelland has also given motivation scores for many more countries for 1950; there are no relationships between these scores and those for death rate clusters for about 1960; however, none would be expected until death rates from about 1975 are available. The ideal future cross-validation study would take the 1950 motivation scores and correlate them with the death rate clusters for every year from 1950 to, say, A.D. 2050.

In addition, other behavioral indices must be added to the cluster (for example, number of hours watching television per capita for the inhibition cluster, crime rates and number of riots for the aggressiveness cluster), including other death rates if possible, since recently available drugs appear to control ulcers and hypertension.

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References and Notes

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2. J. Atkinson, Ed., *Motives in Fantasy, Action, and Society* (Van Nostrand, Princeton, N.J., 1958); D. McClelland, J. Atkinson, R. Clark, E. Lowell, *The Achievement Motive* (Appleton-Century-Crofts, New York, 1953).
3. The measure of correlation used was the Spearman rank-difference correlation rho $= 1 - [\Sigma 6\, d^2/(N^3 - N)]$, where $d =$ the difference between ranks of the scores of the two variables and $N =$ the number of cases. This statistic was used throughout the present study also. See S. Siegel, *Nonparametric Statistics* (McGraw-Hill, New York, 1956), pp. 202–212.
4. J. Brady, R. Porter, D. Conrad, J. Mason, *J. Exptl. Anal. Behav.* **1**, 69 (1958); L. Berkowitz, *Aggression: A Social Psychological Analysis* (McGraw-Hill, New York, 1962).
5. Statistical Office of the United Nations, *Demographic Yearbook, 1954* (United Nations, New York, ed. 6, 1954), table 30, pp. 558–587.
6. Statistical Office of the United Nations, *Demographic Yearbook, 1960* (United Nations, New York, ed. 12, 1960), table 19, pp. 552–569.
7. L. J. Cronbach and P. Meehl, *Psychol. Bull.* **52**, 281–302 (1955).
8. Statistical Office of the United Nations, *Statistical Yearbook, 1960* (United Nations, New York, 1960). The number of books produced per country is given in table 178, pp. 594–597; the number of persons attending motion picture theaters is given in table 183, pp. 605–606. To obtain the rates used in this study, these numbers were divided by the population of the country in 1958, the year to which most of these data are applicable. The number of countries used in these computations was reduced to 15, since data on the Union of South Africa were lacking.
9. Tables showing the countries and raw data used for most of these computations may be obtained from me by sending a request written on an institutional letterhead. I thank Mrs. Janet F. Rees and Dr. William N. Dember for their assistance in performing and reporting this study.

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Strychnine and the Inhibition of Previous Performance

Abstract. *The injection of strychnine sulfate into rats inhibits a hurdle-crossing response. Hurdle-crossing tends to decrease with increasing strychnine doses. The data are interpreted as being consistent with consolidation theory.*

Studies of maze learning (*1*), visual discrimination (*2*), and active avoidance learning (*3*) have shown that injections of subconvulsive doses of strychnine sulfate facilitate learning which involved the emission of locomotor responses. These findings have been attributed to strychnine's enhancement of the consolidation of persisting memory traces which were initiated by training trials.

While there is considerable evidence (*4*) for strychnine's facilitation of locomotor behavior there is no data on whether or not strychnine will similarly affect learning which involves the withholding (that is, inhibition) of a previously performed response. In order to provide this information, we investigated the effects of strychnine on rats' holding back from reentering a situation where a noxious stimulus (shock) had been previously experienced.

The apparatus consisted of a white start box (8 by 9 by 10 cm) separated from a black shock box (29 by 22 by 15 cm) by a guillotine door and a hurdle, 2.5 cm high. The start-box floor was Plexiglas; the shock-box floor consisted of 22 stainless steel rods placed 0.64 cm apart and wired to a Grason-Stadler shock generator (model E 1064GS).

Fifty-four male, Holtzman, albino rats were used. On each of the first 4 days of the experiment, each rat was placed in the start box and allowed to explore both boxes for 120 seconds. A 0.01-second timer measured the amount of time which elapsed before the rat's first hurdle-crossing on each day to provide an operant index of this behavior.

On the 5th day, each rat was placed directly in the shock box and, after 5 seconds, was administered two 1-second presentations of inescapable shock (0.2 ma), separated by 4 seconds. Ten seconds after the end of the second shock, the rat was returned to his home cage, and 15 minutes later received an intraperitoneal injection of either strychnine (0.2 mg/kg, 0.1 mg/kg, 0.05 mg/kg, 0.025 mg/kg, or 0.0125 mg/kg) or 95 percent saline. Nine rats were randomly assigned to each injection condition (*5*).

Beginning on the next day, each rat was administered one test trial on each of 7 days. A test trial began with the rat's being placed in the start box. Five seconds later the guillotine door was raised, starting a 0.01-second timer. When the rat crossed the hurdle into the shock box the timer stopped, yielding a measure of how much time had elapsed before hurdle-crossing occurred. (Henceforth this measure will be referred to as delay of hurdle-crossing.) The rat was returned to his home cage 10 seconds after crossing the hurdle or after 120 seconds in the start box without crossing, whichever came first. In the latter case a latency of 120 seconds was recorded for that trial. No shock occurred during test trials.

After the end of this first experiment,