

Test of a Field Model of Consciousness and Social Change: The Transcendental Meditation and TM-Sidhi Program and Decreased Urban Crime

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A series of three studies is reported that tests the prediction that participation in the Transcendental Meditation (TM) and TM-Sidhi program by a small fraction of the population of a society positively influences quality of life in the entire society, measured here in terms of reduced crime rate. Two cross-lagged panel studies among random samples of U.S. cities over the years 1972-1978 and metropolitan areas over the years 1972-1979 gave evidence for a causal influence of TM program participation in decreasing crime rate. A similar conclusion was supported by a time series analysis, using the transfer function approach, to assess the relationship between weekly variations in the number of participants in the group practice of the Transcendental Meditation and TM-Sidhi program and decreased violent crimes in the District of Columbia over a two-year period. These findings cannot be explained by currently understood principles of behavioral interactions, but are consistent with the proposal that consciousness has, more fundamentally, a field character. Theoretical and practical implications of these results are discussed.

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The purpose of this paper is to present evidence for a hypothesized new mechanism of social change, with implications for improving the quality of life in society. The hypothesis being tested is that consciousness in its pure state has the character of what in the physical sciences is termed a "field," and that this field has a causal influence on observable social indicators. This proposition is tested by the prediction that a small number of individuals in a society participating in the Transcendental Meditation and TM-Sidhi program, a technology for the development of consciousness founded by Maharishi Mahesh Yogi, will result in improved quality of life (e.g., reduced crime rate) throughout the entire society.

The description of consciousness as a field is found in the earliest records of antiquity, where it is articulated in the Vedic tradition of India. ("Veda" is Sanskrit for "knowledge.") According to the Vedic tradition, the deepest level of the consciousness of each individual is a unified field of "pure consciousness," which is described as the most basic level of nature (Maharishi Mahesh Yogi, 1969; *Principal Upanishads*, 1974). The idea of a field of consciousness also has a surprisingly rich lineage in psychology, being considered by James, Fechner, and others (Dillbeck, Cavanaugh, Glenn, Orme-Johnson, and Mittlefehldt, 1987). The concept was not pursued by scientific psychology because of the difficulty of deriving testable implications, and because of a general shift in the focus of the discipline from subjective experience to behavior. Although in recent decades consciousness has assumed an increasingly important role in attempts to understand physiological and behavioral processes (Natsoulas, 1981; Sperry, 1987), the concept of a field of pure consciousness is novel to current research. We consider here only a small portion of the Vedic psychological theory elaborated recently by Maharishi Mahesh Yogi (1977, 1986), in order to discuss and test the concept of a field of pure consciousness in the context of social change.

According to the Vedic tradition, the field of pure consciousness can be directly experienced by the individual in a "self-referral" state; in this state awareness is open to its nature as an unbounded field rather than being bound by objects of thought or perception (Maharishi Mahesh Yogi, 1986, p. 29). The regular experience of this state is said to increase the individual's breadth of comprehension, leading to the development of higher states of consciousness (Maharishi Mahesh Yogi, 1969; Patanjali, 1912/1978). One characteristic of this development is that the individual's behavior is described as both increasingly effective and in greater harmony with the needs of others.

Maharishi, in his revival of ancient Vedic science, offers the Transcendental Meditation and TM-Sidhi program as a practical means to the development of consciousness (Maharishi Mahesh Yogi, 1986, pp. 42-44). The purpose of the Transcendental Meditation technique is to allow the individual to effortlessly experience the field of pure consciousness; the TM-Sidhi program is an advanced procedure to stabilize the experience of pure conscious-

ness (Maharishi Mahesh Yogi, 1986, p. 96). These procedures are practiced twice daily, morning and afternoon. A body of several hundred physiological and psychological studies on these practices supports the pattern of development predicted to occur, as reflected in improved physical health, mental health, and cognitive functioning, and more effective behavior patterns among normal subjects as well as special populations such as prison inmates (e.g., Alexander, 1982; Bleick and Abrams, 1987; Brooks and Scarano, 1985; Dillbeck, 1977, 1982, 1983; Dillbeck and Orme-Johnson, 1987; Frew, 1974; Pelletier, 1974; Orme-Johnson, 1987; Orme-Johnson and Farrow, 1976; Shecter, 1978).

According to Maharishi's Vedic psychology, the influence of individuals on society is not only through behavior but also through the consciousness of all the individuals collectively. The quality of behavior at each level of society—family, community, city, state, nation, or the world—is said to be directly influenced by the quality of "collective consciousness" of the society (Maharishi Mahesh Yogi, 1977, pp. 122–127). The quality of consciousness and behavior of each individual in society contributes to the quality of the collective consciousness, and is reciprocally influenced by the collective consciousness of the society (Maharishi Mahesh Yogi, 1977, pp. 123–127).

The development of the awareness of individuals to higher states of consciousness is predicted to lead to a "coherent" quality of collective consciousness, characterized by greater integration between individual needs and needs of society as a whole (Maharishi Mahesh Yogi, 1978, pp. 146–156). In contrast, lack of breadth of awareness of the individuals in society is said to lead to actions that do not support either the social good or the long-term happiness of the individual actor. The result is mistakes and problems in individual and collective life, giving rise to stress (lack of coherence) in the collective consciousness of society (Maharishi Mahesh Yogi, 1986, pp. 97–98). The accumulation of stress in collective consciousness leads to growing disorder in society, reflected in levels of crime, social turbulence, and other indicators of lack of social harmony (Maharishi Mahesh Yogi, 1986, pp. 83–84).

From the perspective of Maharishi's Vedic psychology, social problems thus have their basis both in the quality of individual life and in the quality of the whole society. According to Maharishi, because of this interdependent relationship between the individual and society, the most effective way to alleviate social problems is from the common basis of both individual and collective consciousness, the field of pure consciousness (Maharishi Mahesh Yogi, 1986, pp. 70–92). Without influencing society from this more fundamental level, attempts to relieve social problems have either (1) strived to create changes in individual behavior on a large scale, or (2) endeavored to change the structure or dynamics of society as a whole through political, economic, or social programs.

Sociological and social psychological theories of crimes causation illustrate these two approaches to ameliorating the problem of crime. Social disorganiza-

tion theory (e.g., Elliot and Merrill, 1961) suggests disruption of traditional social bonds in industrialized society as a cause of crime and points to reorganization or urban areas or perhaps even the national economic structure as possible solutions. Anomie theory (Merton, 1957), the differential opportunity hypothesis (Cloward and Ohlin, 1960), and the frustration-aggression hypothesis (Berkowitz, 1962) are all based on the concept that deviance is caused by discrepancy between socially shared goals and acceptable means to achieve these goals; such viewpoints suggest a reorganization of the opportunity structure throughout society. Social learning theory applied to criminology (Sutherland and Cressey, 1978) suggests that the social history of individuals must be altered in many individuals, perhaps through social programs to improve child-rearing practices (Cressey, 1978). Although all the factors cited contribute to stress in individual and collective life, the programs proposed to alleviate crime are quite problematic, even if evidence existed that they could be effective. Simply because the factors they address are so complex and pervasive throughout the fabric of society, the interventions suggested by these theoretical perspectives are enormous in scope and cost and therefore very difficult to implement.

The mechanism tested here for improving the quality of life in society is a field effect on the level of pure consciousness, at the basis of both individual and collective consciousness (Maharishi Mahesh Yogi, 1978, pp. 191–202). In physics, the phenomenon of effects propagated at a distance is associated with all fields (Sudarshan and Mukunda, 1974, pp. 564–566). Thus, if pure consciousness is a field, as described by Maharishi's Vedic psychology, then a field effect in society may also be created by an effect of sufficient strength on the level of pure consciousness. Maharishi (1986) asserts that it is necessary only to have a small percentage of the population regularly and systematically experiencing the field of pure consciousness in order for increased coherence to be expressed in the collective consciousness of the entire society. As noted earlier, increased coherence of collective consciousness is defined in terms of increased integration between the desires of citizens and the social good, and is therefore operationally reflected in measurable reductions in negative trends such as crime, violence, and turbulence, and increased positive trends (Maharishi Mahesh Yogi, 1977, pp. 8–10).

The specific number required for such an effect in society was proposed by Maharishi as early as 1960 to be about one per cent of the population experiencing the field of pure consciousness through the Transcendental Meditation technique, and the first study to investigate this phenomenon named it the "Maharishi Effect" (Borland and Landrith, 1976, p. 648; studies are reviewed below). With the introduction of the advanced TM-Sidhi program in 1976, Maharishi proposed that an even smaller proportion, the square root of one percent of the population of a society participating together as a group in the practice of the Transcendental Meditation and TM-Sidhi pro-

gram, would create this effect in the entire society (Maharishi European Research University, 1979, p. 160).

The square root figure derives from a field-theoretic model in which the overall influence of coherence from many individuals is analogous to a coherent superposition of amplitudes. The coherent summation of amplitudes from many sources ("constructive interference") creates a situation in which each individual source contributes nonlinearly to an overall influence, because the power or intensity of a field is proportional to the square of the amplitude of the field. Thus, the intensity of effect of coherence for society, in this model, is proportional to the square of the number of participants; the figure of one per cent in the square root of one per cent formulation is an empirical constant of proportionality suggested by prior research on the Maharishi Effect (Hagelin, 1987, p. 65).

The first study of the Maharishi Effect assessed changes in crime rate in all U.S. cities larger than 25,000 population that were not part of a larger metropolitan area and in which one per cent of the population had been instructed in the TM program by 1972. There were 11 such cities, and these cities showed a significant decrease in crime rate in 1973 in comparison to control cities matched for geographic region, population, college population, and prior crime rate (Borland and Landrith, 1976). In control cities crime rate increased, as did the crime rate in the nation as a whole. A subsequent study replicated the results of this first study while extending both the sample and time period. All cities larger than 10,000 population that met the criteria of Borland and Landrith (1976) were included, and these 24 cities were matched with control cities according to the same criteria as the previous study by an independent researcher prior to data collection (Dillbeck, Landrith, and Orme-Johnson, 1981). Experimental cities again showed a significant decrease in crime rate in 1973 in contrast to control cities; in addition, experimental cities displayed a significant decrease in the trend of crime rate (least-squares slope from 1972-1977 in comparison to 1967-1972) in contrast to an increase among control cities. These differences were found after covarying for demographic variables related to crime rate on which the two groups of cities differed.

Since these initial studies of the Maharishi Effect, a number of researchers, including ourselves, have focused during the past ten years on an extensive research program designed to replicate this phenomenon using methods of increasing sophistication in order to address the issue of causality. One approach has been to use methods derived from causal modeling techniques, such as cross-lagged panel analysis, to control for possible unmeasured "third cause" variables and to elucidate the causal direction of the relationship between TM program participation and crime rate change among random samples of cities and metropolitan areas. Another approach that has become available since the introduction of the TM-Sidhi program is to use time series

analysis either (1) to assess the effects of assemblies on which large numbers of participants in this program gather for specific periods of time (where the courses are analyzed as quasi-experimental interventions), or (2) to assess the effects of daily or weekly variations in the number of individuals participating in this program in places where there are stable groups, such as educational institutions that implement the Transcendental Meditation and TM-Sidhi program in their educational process. Because individuals numbering only the square root of one per cent participating in the group practice of the TM-Sidhi program is proposed to be required to create the Maharishi Effect, it is practically feasible to create groups of sufficient size for a predicted effect on metropolitan, state, national, or even international social systems.

The replication studies of the Maharishi Effect have had consistent results, and the body of research is being prepared for publication, often with several studies together in each paper in order to convey the programmatic nature of this research. For example, a recent major paper contained five studies using time series methodology to assess the effects of assemblies, varying in length between one and five months, which involved the group practice of the Transcendental Meditation and TM-Sidhi program (Dillbeck et al., 1987). Three of these studies used crime totals as the dependent or endogenous variable, one in the Union Territory of Delhi (capital district of India) using daily data, one in Metro Manilla (capital district of Philippines) using weekly data, and one in the territory of Puerto Rico using monthly data. The other two studies, in Metro Manilla and in Rhode Island, assessed effects on more comprehensive quality of life indices that equally combined a number of variables available on a monthly basis; these variables included not only crime rate but also vital statistics and health-related behaviors. In each study, time series analysis using the Box-Jenkins approach revealed significant improvements in the quality of life during the periods of the experimental interventions, and these could not be attributed to previous dynamics of the social indicators. Alternative hypotheses in the form of other historical events involving governmental or police authorities were investigated, and these were found not to account for the observed changes.

Another recent paper reports the results of a planned experiment in the Middle East, in which a large group of TM-Sidhi program participants was created in Jerusalem during August and September of 1983 (Orme-Johnson, Alexander, Davies, Chandler, and Larimore, in press). Time series analysis indicated improvements in quality of life indicators in Jerusalem, Israel, and extending into Lebanon when the group reached the size predicted by theory to be sufficient for each of these population groups; the indicators included decreased conflict in Lebanon.

The present paper presents three studies assessing changes in crime rate associated with the Maharishi Effect. The first two studies replicate one another and were designed to identify, in a slowly-developing situation in

which people are instructed in the Transcendental Meditation program over many years, whether TM program participants can be isolated as a causal factor in crime rate decrease while controlling for the hypothesis of spurious "third variable" causality. The studies use the method of cross-lagged panel analysis in large random samples of U.S. cities and metropolitan areas in the 1970's to achieve this goal. The third study uses time series analysis to assess whether the number of participants in the Transcendental Meditation and TM-Sidhi program, in excess of the square root of one percent of the population, have an influence on weekly crime totals in a large metropolitan/regional area.

Study I

Method

Sample. A random sample of 40 U.S. cities was selected from each of four population groups: larger than 250,000; 100,000-250,000; 50,000-100,000; and 25,000-50,000. Cities with college population in excess of 10 per cent were not sampled; the mobility of this population might result in serious measurement error in the independent variable over the long time period of the study. The total sample of 160 cities contained 26 per cent of all cities larger than 25,000 population and comprised 25 per cent of the total U.S. metropolitan population in 1970 (U.S. Bureau of the Census, 1972).

Measures. The measure of crime used was the Federal Bureau of Investigation (FBI) "Uniform Crime Index" total, comprised of the incidence of homicide, forcible rape, aggravated assault, robbery, burglary, larceny, and motor vehicle theft. (Arson was added to the index in 1979, but is not included here.) The crime index total for each city was obtained for each year from 1964 to 1978, the last year for which published data were available at the time of beginning the study (U.S. Department of Justice, 1964-1978). Although FBI data are not free from bias, the FBI figures are the only reliable data for a large-scale study of crime rate changes at the city or metropolitan level. The sources of bias in FBI statistics are not factors that could be presumed to be related to TM program participation (Maltz, 1977; Skogan, 1977), and the FBI data also were collected independent of any familiarity with the hypothesis of the present study.

Crime totals were converted to crime rates per 10,000 population for each city, using the population figures published by the U.S. Bureau of the Census (1972, 1977). Population estimates for years for which there were no totals or estimates published by the Bureau of the Census were obtained by linear interpolation between published figures. In order to assess changes in crime rate beginning in 1972, the dependent variable used for each city was the deviation of the observed crime rate from its expected value. The expected

value was the figure predicted by linear regression from each city's prior trend in the period 1964-1971. This measure was chosen on the basis of previous research (Dillbeck, Landrith, and Orme-Johnson, 1981) as a sensitive index of change that controls for the differing prior history of each city in a period of steadily increasing crime rates. In the case of missing values for one or more years during the baseline period of 1964-1971, the best-fitting straight line was fitted for the remaining data points. This measurement approach assumes a linear trend of crime rate change during the baseline period, which was in fact the case (Fox, 1978). Any deviation from linearity in individual cities should be expected to add to measurement error and reduce the likelihood of (rather than create) the predicted results, unless this deviation was related to demographic trends associated with crime that causally influence participation in the TM program, in which case this influence should be found in the cross-lagged analysis itself (see below).

Participation in the Transcendental Meditation program was defined as the percentage of a city's population instructed in the TM technique as of the beginning of each year. The number of participants in the TM program in each city was obtained from the organization that teaches the program in the U.S. (World Plan Executive Council, personal communication, November, 29, 1978). These totals are adjusted for individuals notifying the organization of change of address. In the present sample, the average level of TM program participation in 1976 was .45 per cent. Any attrition from regularity of practice is assumed constant across cities. If so, the linear relationship between variables will not be affected; if not, measurement error is compounded and this should reduce the magnitude of measured effects rather than spuriously create such effects.

Design and procedure. This study uses the method of cross-lagged panel correlation to provide evidence for the causal nature of the relationship, at the city level, between participation in the Transcendental Meditation program and crime rate decrease. Cross-lagged panel correlation (CLPC) involves at least two variables (X and Y) measured over (at least) two points in time (one and two). To state the CLPC procedure most simply, one compares correlations between two variables each lagged the same number of time periods, looking for evidence of significantly greater leading influence of one variable. That is, one compares two cross-lagged correlations, i.e., the correlation of variable X (TM program participation) at time one with variable Y (crime rate change) at time two, and the correlation of variable Y at time one with variable X at time two. If the quite restrictive statistical assumptions of the CLPC procedure are met, then a finding of unequal cross-lagged correlations gives evidence for a rejection of the null hypothesis that the relationship between the two variables is due to any unmeasured variable (a spurious relationship) rather than causality (Kenny, 1975, 1979, pp. 227-249; Locascio, 1982).

One of the most critical assumptions of CLPC is "stationarity," which means

that the underlying structural equation of the statistical model is the same at the two time periods, i.e., that the causal process did not change during the period studied. Equality of the synchronous correlations (between the two variables at time one and time two) has been used as a test of stationarity in the case of two variables and two time periods; such equality is a necessary but not sufficient condition for stationarity. A more stringent test of the assumption of stationarity can be provided by adding at least two more variables at each time point and adjusting both synchronous and cross-lagged correlations for changes in communality among the set of variables. In this case, tests of differences of synchronous correlations are a clear test of a more relaxed version of the stationarity assumption (Kenny, 1975).

The second major assumption of cross-lagged panel analysis is "synchronicity," which simply states that variables must be measured at the same time. Threats to this assumption are retrospection (in psychological data) and aggregation. It may be questioned whether the TM participation variable (total instructed by a given date) violates the assumption of synchronicity as an aggregated measure. However, this variable describes the percentage of people in a city who, at any one time, are presumed to be regularly practicing the technique.

The third assumption of CLPC that has recently been discussed is that the method assumes equal stability (correlation from time one to time two) of the two variables (Rogosa, 1980). This assumption will be addressed in the discussion of the results.

Another point about CLPC is that the statistical assessment of cross-lagged differences has low power; it is difficult to find significant cross-lagged differences even with moderate sample sizes, between 75 and 300 (Kenny, 1975). For this reason, one should look for consistency of results across a range of replications, in the same direction of change, even if not all comparisons of interest reach statistical significance. As suggested by Kenny (1975) we look at effects over a number of time lags and across another sample (see Study 2) in order to provide opportunity for this consistency of results.

A final assumption of the CLPC method relevant to testing the hypothesis of this study is that any correlational approach assumes a linear relationship between variables of interest. It might be questioned whether this is appropriate since a threshold model of the effect of TM program participation has been supported by the previous research on the Maharishi Effect. However, even so, the relationship between TM program participation and crime rate decrease is presumed monotonic rather than quadratic or some other such function, and in the presence of stochastic noise due to many uncontrolled influences in a diverse sample, a linear function is a good approximation of a monotonic relationship. In the presence of a genuine threshold effect, the correlational approach required for the CLPC method should have the effect of reducing the magnitude of observed correlations and differences

in correlations. Thus, if any bias is introduced by the linear assumption, it should work against rejection of the null hypothesis. It should be clear that the purpose of the present study is to use the CLPC methodology to assess the possible causal relationship between TM program participation and crime rate decrease in a large random sample of cities, not to test alternative models of the Maharishi Effect in a sample specifically chosen to maximize this effect. The requirement of a large sample size is imposed by the low power of the CLPC methodology.

In order to control for specific social variables that might represent obvious alternative causes for the relationship between TM program participation and crime rate decrease, partial correlations as well as raw correlations were computed as a primary measure for CLPC analysis. A number of social variables, found from previous research to be related to crime rate variation (e.g. Beasley and Antunes, 1974; Mladenka and Hill, 1976; Quinney, 1966; Schmitt, 1957; Spector, 1975; Sutherland and Cressey, 1978), were included in a multiple regression analysis to assess their contribution to crime rate change each year. These variables were median years education, percentage unemployed, per capita income, percentage of families in poverty, stability of residency over five years, median age, percentage over age 65, population size, population density, and ratio of police per population. All variables were taken from 1970 census data, the census figures which were near the midpoint of the full range of years for which crime rate was assessed (1964–1978), and which led in time the yearly changes of interest (1972–1978).

Results

The first step in the data analysis was the determination of variables for which to control in the calculation of partial correlations for CLPC analysis. Multiple regression analyses of the demographic variables listed above with the crime rate variable for each year from 1972 to 1978 indicated that the following four variables made significant independent contributions to predicting crime rate change each year—police per population, median years education, unemployment rate, and percentage over age 65. Kenny (1975) points out that control variables used for partial correlations in CLPC should explain equivalent amounts of variance in the two time periods assessed in order not to introduce bias. Although none of the four variables was equally correlated with crime over all time periods, their combination was. In addition, the results of the CLPC for partial correlations are virtually identical to the results obtained if only simple correlations are used. Synchronous raw and partial correlations between TM program participation and crime rate change were then calculated; these were significant for each year from 1972 to 1978 except for the 1972 partial correlation (Table 1), although of low magnitude.

Table 1
Synchronous Correlations and Results of
Cross-Lagged Panel Analysis of Cities

Year	Synchronous Analysis (r)			Cross-Lagged Analysis (z)		
	n	Raw	Partial	Years	Raw	Partial
1972	146	-.211**	-.135	—	—	—
1973	146	-.189*	-.143*	1972-1973	-.533	.101
1974	146	-.178*	-.160*	1972-1974	-.823	-.737
1975	146	-.205**	-.216**	1972-1975	-1.208	-1.001
1976	146	-.193*	-.209**	1972-1976	-1.717*	-1.684*
1977	145	-.189*	-.208**	1972-1977	-1.888*	-1.938*
1978	145	-.181*	-.159*	1972-1978	-.895	-.981

Note: The effective n used for tests of significance of partial correlations is four less than the actual sample size, to reflect four less degrees of freedom.

* $p < .05$, one-tailed. ** $p < .01$, one-tailed.

The major analysis, the cross-lagged panel analysis, assessed cross-lagged differences of raw and partial correlations between 1972 and each subsequent year. The cross-lagged differences were each in the direction that would be predicted by the hypothesis of TM program causality, except one that was close to zero. Two of these differences, between 1972-1976 and 1972-1977, reached statistical significance for both raw and partial correlations. Table 1 lists the z -scores for the tests of cross-lagged differences, and Figure 1 contains the pattern of correlations for the periods involving the significantly different cross-lagged correlations. All significance tests for the magnitude of synchronous correlations and for differences of cross-lagged correlations are one-tailed tests because the direction of relationship is clearly predicted.

In order to provide some evidence about the assumption of stationarity, tests of significance of the difference between the two synchronous correlations were run for each of the six time lags. These were two-tailed significance tests because a difference in either direction would violate the assumption. None of these tests were significant ($z < 1.0$ in absolute value in each case).¹

¹In order to more stringently check the more relaxed version of the stationarity assumption, "quasi-stationarity" (Kenny, 1975), two additional variables were added and adjustments were made for changes in the communality of the set of variables, as described in the *Procedure* section. From vital statistics data (U.S. Public Health Service, 1967-1978) two background variables were added, deaths by motor vehicle accidents and by suicide; these were computed in the same way as the crime data, deviations from a linear regression slope (1967-1971), although this method of measurement may not be ideal for variables other than crime, which was rapidly increasing over the years studied. Results of the cross-lagged analysis were identical for partial correlations when this was done, and three of six adjusted cross-lagged differences were significant in the predicted direction for raw correlations. Synchronous correlations did not significantly differ for any pair of years; this gives further evidence that the reported results were consistent with the assumption of stationarity.

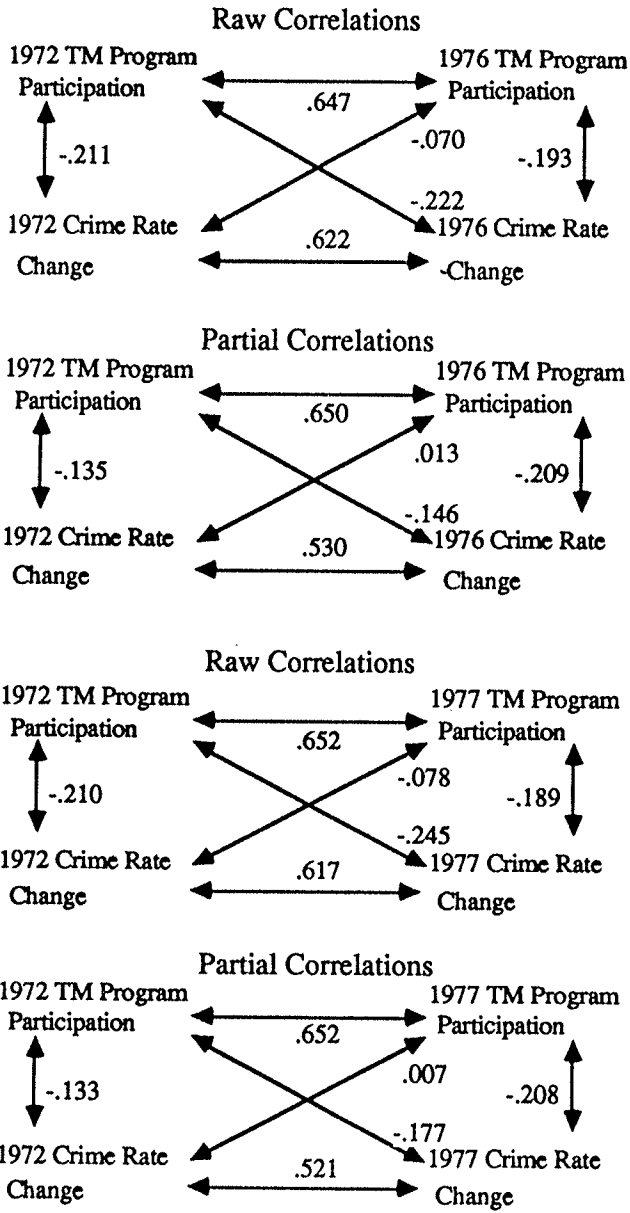


Figure 1. Pattern of raw and partial correlations among cities for years with significantly different cross-lagged correlations (1972-1976, 1972-1977).

Discussion

The findings of the present study are consistent with what is predicted by the hypothesis of TM program participation causing crime rate decrease rather than the null hypothesis of a spurious relationship between these two variables. Discussion of results in light of statistical issues regarding the CLPC method is postponed until after the replication study (Study 2), since the issues are identical in each case.

One consequence of taking a large random sample of cities over a wide population range is that smaller cities might be part of a larger metropolitan area. That is, an uncontrolled factor is possible proximity to another population center with potentially different characteristics in terms of both TM program participation and crime rate patterns. The second study replicates the first study using the CLPC methodology with a random sample of metropolitan areas. By looking at metropolitan areas as a whole, the uncontrolled variation due to proximity of one city to another might be reduced.

Study 2

Method

Sample. The sample consisted of 80 U.S. standard metropolitan statistical areas (SMSA's). Random samples of 40 SMSA's were chosen from the two population groups of 500,000 or larger and 200,00-500,000 by 1970 census figures. This sample constituted 55% of SMSA's over 200,000 population, and included 47% of the total metropolitan population of the U.S. in 1970 (U.S. Bureau of the Census, 1972). The average level of TM program participation of the metropolitan areas in 1976 was .33 per cent.

Measures. The measures of this study were identical to the first study, with three differences. The first difference is that the crime index figure used in the present study did not include the larceny category; this is because the FBI reporting system changed the larceny category definition in 1973 to include all larceny rather than larceny over \$50. Published reports of the FBI do not allow SMSA larceny figures after 1973 to be made comparable to earlier figures, as can be done for cities.

The second difference is that 1979 crime figures were available at the time of the study and were included in an additional replication (U.S. Department of Justice, 1964-1979). The variable of TM program participation used for the 1979 analysis was the percentage of participation in the SMSA's by August 1978 rather than by the end of December 1978; this was the most recent figure available at the time of the study.

The third variation from Study 1 was that a slightly expanded list of variables was selected as potential demographic variables for which to con-

Table 2
Synchronous Correlations and Results of Cross-Lagged
Panel Analysis of Metropolitan Areas

Year	Synchronous Analysis (r)			Cross-Lagged Analysis (z)		
	n	Raw	Partial	Years	Raw	Partial
1972	78	-.006	-.010	—	—	—
1973	79	-.107	-.108	—	—	—
1974	79	-.206*	-.196*	1973-1974	-1.997*	-1.977*
1975	79	-.210*	-.208*	1973-1975	-2.141*	-2.347**
1976	78	-.178	-.164	1973-1976	-1.618	-2.002*
1977	77	-.147	-.106	1973-1977	-1.174	-1.396
1978	76	-.188	-.165	1973-1978	-1.572	-1.860*
1979	78	-.215*	-.202*	1973-1979	-2.001*	-2.437**

Note: The effective *n* used for tests of significance of partial correlations is two less than the actual sample size, to reflect two less degrees of freedom.

p* < .05, one-tailed. *p* < .01, one-tailed.

trol by partial correlation prior to CLPC—median education, median age, percentage of families in poverty, per capita income, percentage unemployed, population, population density, change in population (1960–1970), area, black population, change in black population (1960–1970), stability of residency over five years, and percentage of college students. All data were taken from 1970 census data. Police coverage figures and percentage of population over age 65 were unavailable for SMSA's.

Design and procedure. The design and procedure for the second study were exactly the same as for the first study.

Results

Multiple regression analyses were first run to identify variables for partial correlation with crime rate change prior to CLPC analysis. The two demographic variables of per capita income and black population were consistent across each year as candidates for partial correlation. The multiple correlations between demographic variables and crime rate change variables were not identical across all years. There was a slight decrease over time from 1972 to 1979 in the multiple correlation; however, the same general pattern of results emerges whether raw or partial correlations are used.

The synchronous raw and partial correlations between TM program participation and crime rate change among the SMSA's were again low order negative correlations, significant for both raw and partial correlations in 1974, 1975, and 1979 (Table 2). The relationship showed a later onset among the SMSA's than among the cities of Study 1; this makes sense if a given proportion of TM participants is required for some measurable effect to be found,

since the SMSA's had a lower proportion of participants than the cities, as noted above.

The pattern of synchronous correlations raises the question of the statistical assumption of a stable causal model for CLPC. The results of tests of differences of synchronous correlations are also consistent with a developmental process. For the seven time lags from 1972 to each subsequent year, three of the synchronous differences were significant at the .10 level for raw correlations, and two differed significantly at this level for the partial correlations.

In order to ensure that the pattern of results is not confounded by a developing rather than a stable causal structure, the cross-lagged differences were assessed beginning from 1973 to all later years. None of the differences in synchronous correlations was significant for these time periods at the .10 level, consistent with the assumption of stationarity.²

The major results of the CLPC are listed in Table 2. The cross-lagged differences of partial correlations from 1973 to later years were statistically significant for five of the six time lags beginning in 1973 and the cross-lagged differences of raw correlations were significant for three of the six time lags. Moreover, all of the cross-lagged comparisons were in the same direction as these significant results, which is the direction predicted by the alternative hypothesis of the causal influence of TM program participation in decreased crime rate. Patterns of raw and partial correlations are given in Figures 2 and 3 for each of the significantly different cross-lagged analyses.

Discussion

The results of the second study replicate those of the first and are consistent with the hypothesis of a causal influence of the TM program on decreased crime rate. However, it has been pointed out that two causal hypotheses are actually consistent with any significant difference in cross-lagged correlations (Kenny, 1975). In the present case, the differences found could be consistent with either TM program participation causing decreased crime rate, or else increased crime rate causing an increase in participation in the TM program. Two lines of evidence support the first of these hypotheses (Kenny, 1975). One is that the sign of the correlation is negative, a result consistently found in prior research; the second is that in each case of a significant difference the cross-lagged correlation is larger than the synchronous correlations (Figures 1-3).

²When the background vital statistics variables were added, as in Study 1, to more stringently test the quasi-stationarity assumption by adjusting synchronous and cross-lagged correlations (Kenny, 1975), none of the synchronous correlations differed between 1973 and later years, consistent with the assumption. Cross-lagged results were also comparable, with four of six lags significant for partial correlations and one of six for raw correlations, in the predicted direction.

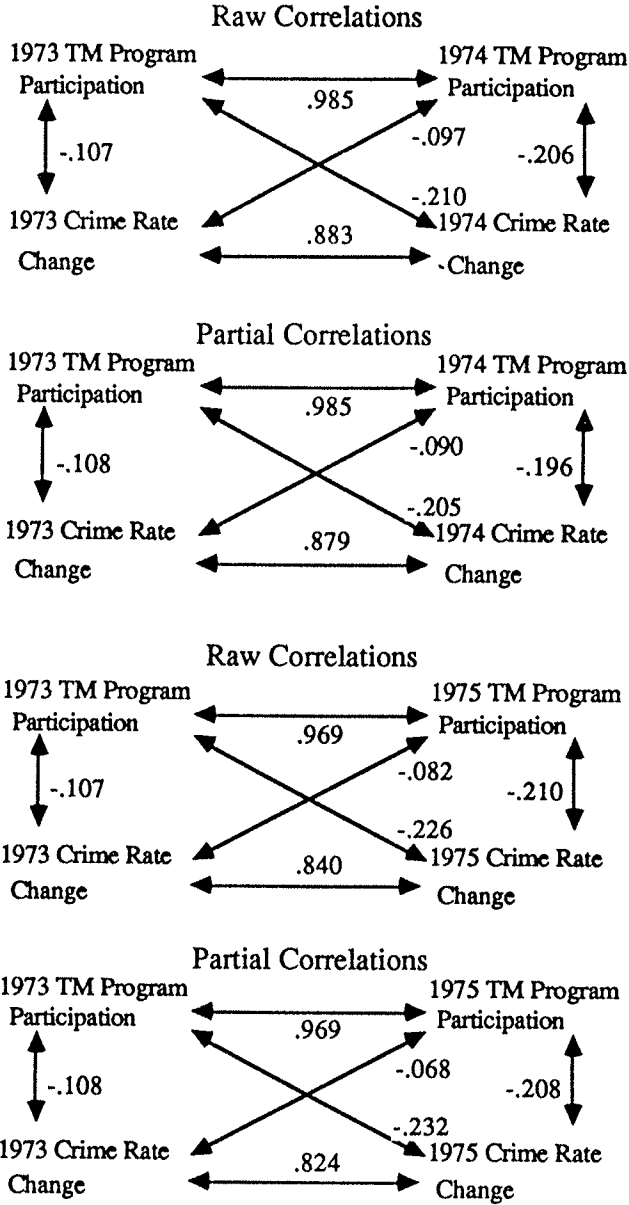


Figure 2. Pattern of raw and partial correlations among SMSA's for first two years with significantly different cross-lagged correlations (1973-1974, 1973-1975).

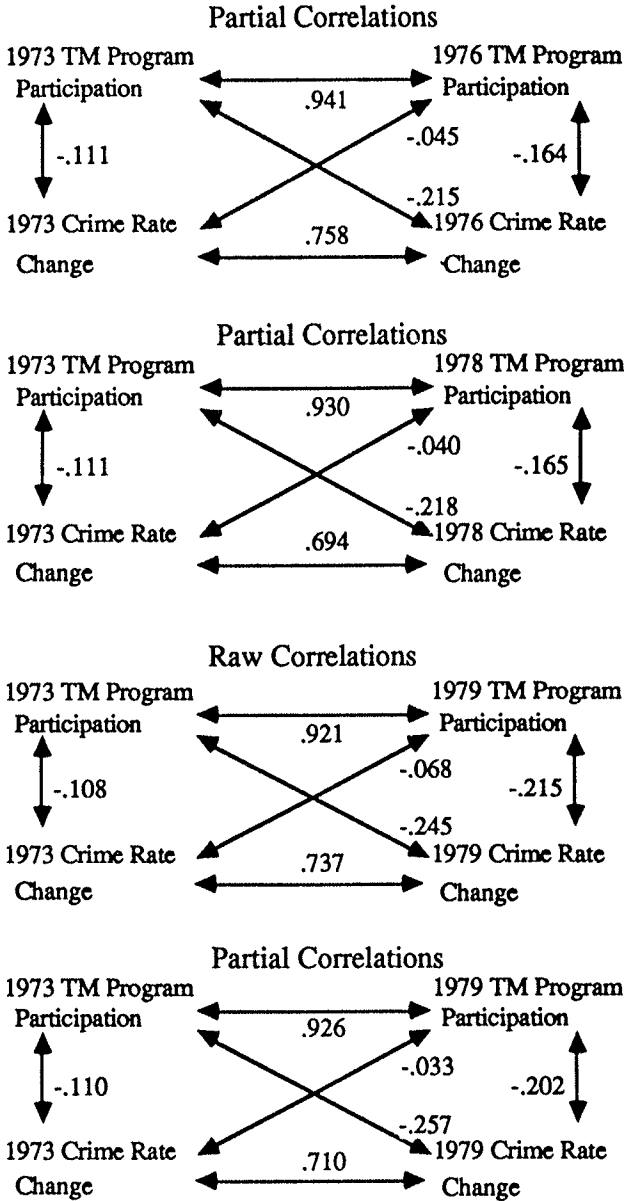


Figure 3. Pattern of raw and partial correlations among SMSA's for later years with significantly different cross-lagged correlations (1973-1976 for partial correlations, 1973-1978 for partial correlations, 1973-1979).

Another issue to be addressed is the additional assumption of equal stability (Rogosa, 1980). It can be seen in Figures 1 to 3 that for each of the examples of significant cross-lagged correlations, the stability of the variable of TM program participation was higher than that of the variable of crime rate change. However, it has been identified that the direction of bias in cases of unequal stabilities is that the variable with lower stability will appear to be the causal factor (Rogosa, 1980). In the case of the present results, this indicates that bias in the results due to the unequal stability would work against finding results consistent with the hypothesis of the study, and thus the results reported above should be considered conservative.

The size of the correlations in the two studies between TM program participation and crime rate decrease are lower than in previous studies. This seems to be due to the fact that the samples are large, diverse, and random, rather than being selected solely for high levels of TM participation. The average of the lagged correlations in Figures 1 and 2 (TM leading crime decrease) was $-.22$, accounting for about five percent of the total variance in crime rate change. It should be noted, however, that this is not an insubstantial effect for an impact on a social system. Rosenthal and Rubin (1982) note that there is a tendency to underestimate the importance of behavioral interventions because they are associated with what are thought to be low values of r^2 . They point out that a correlation of $-.22$ is equivalent to an improvement of 17.6 per cent in a dichotomous outcome variable (e.g., cure rate) due to a treatment (Rosenthal and Rubin, 1982, p. 168).

The results of the two studies, rather than suggesting a spurious relationship, give evidence using CLPC for a causal influence, associated with the level of participation in the TM program, on decreased crime rate. Another approach to assessing the causal structure of the relationship between variables is through the use of time series analysis. This approach allows inferences to be made about immediate changes in a dependent or endogenous variable on the basis of changes in an independent or exogenous variable, while controlling for spurious relationships due to the internal dynamics over time of either variable.

The possibility for time-series studies arose with the introduction of the advanced TM-Sidhi program in 1976. The prediction that the Maharishi Effect would result from only the square root of one per cent participating in the group practice in Transcendental Meditation and TM-Sidhi program, a very small proportion of a state, national, or even international population, opened the possibility for performing time series studies that either model the effects of temporary large courses as experimental interventions (impact assessment approach) or else use daily, weekly, or monthly totals of large groups of participants in this program as a continuous exogenous variable for the purpose of modeling the input-output relationship between this variable and social parameters (transfer function approach). The following study uses

the transfer function approach to assess the effects of group practice of the Transcendental Meditation and TM-Sidhi program upon the occurrence of violent crimes in the District of Columbia.

Study 3

Method

Sample. A large group of participants in the Transcendental Meditation and TM-Sidhi program was created in the District of Columbia in the autumn of 1981. Some participants were students and staff of a branch campus of Maharishi International University, the MIU College of Natural Law, for which a facility was acquired at that time in the District of Columbia. Other participants in the group practice of the Transcendental Meditation and TM-Sidhi program were members of the Washington, D.C. community. Daily group practice was held at the college and at a nearby residential facility. Prior to the fall of 1981, a smaller number of community members had also gathered during these times for group practice of the Transcendental Meditation and TM-Sidhi program. The square root of one per cent of the three and one-quarter million population of the Washington, D.C. metropolitan area (U.S. Bureau of the Census, 1985) was 180, while the square root of one percent of the actual District proper was 80. During the week beginning October 16, 1981, the average number of participants first rose above the 180 figure, and was maintained above this level for the next two years; the group size rose above the number 80 for the first time only the prior week. Thus, irrespective of whether one considers the District or the larger regional area of which it is a part, during this period an effect of the group practice on quality of life would be predicted.

Measures. Weekly totals of violent crimes for the District of Columbia were obtained from the Metropolitan Police Department of the District of Columbia. Totals of violent crimes were those reported according to the standards of the Federal Bureau of Investigation Uniform Crime Report system, i.e., totals in the categories of homicide, forcible rape, aggravated assault, and robbery. Weekly totals rather than rates were used as the dependent or endogenous variable because population variation was not available on a weekly basis, and must be assumed to be negligible given the stable population total of the District over longer periods (U.S. Bureau of the Census, 1985).

Weekly averages of participants in the group practice of the Transcendental Meditation and TM-Sidhi program served as the independent or exogenous variable. During the period from October to December, 1981, weekly averages were able to be estimated quite accurately from records of the number of residents at the two facilities (all of whom practiced the Transcendental Meditation and TM-Sidhi program) and counts of the number of participants

from the community. Beginning in January of 1982, exact totals of participants in each of the group sessions were recorded. Data were obtained by the second author from the locations of group practice. The figure used as the independent variable was the average number of weekly participants in the afternoon group practice.

The period of study was two years, from the week beginning October 16, 1981 (when the weekly average first exceeded the square root of one percent of the metropolitan area) to the week ending October 20, 1983. This time series consisted of 105 pairs of weekly data points.

Design and procedure. The relationship between the exogenous and endogenous variables was modeled using the transfer function analysis approach of Box-Jenkins time series analysis (Box and Jenkins, 1976). Time series analysis procedures are the appropriate statistical methodology for rigorously assessing relationships between time-dependent variables, because two variables can exhibit correlations that are artifacts of the serial dependence of each, rather than expressing a true relationship between them. The transfer function approach of time series analysis models the relationship between two variables controlling for this time dependence and is thus particularly useful for empirically determining the form of causal connection between variables (McCleary and Hay, 1980, p. 228).

The transfer function model may be specified as $Y_t = C + v(B)X_t + N_t$, where Y_t is the endogenous variable, C is a possible constant, X_t is the exogenous variable, $v(B)$ is the transfer function, and N_t is a stochastic term to denote the disturbance or noise model, reflecting the combined nonrandom effect of all influences other than exogenous variable (Box and Jenkins, 1976). The noise model N_t is comprised of a set of autoregressive and moving average parameters specifying the precise nature of the relationship $N_t = [\phi(B)]^{-1}\theta(B)a_t$, between the residuals of the transfer function and the input a_t , where a_t is a series of independent random disturbances; the terms $\theta(B)$ and $\phi(B)$ denote the moving average and autoregressive parameters, respectively. Similarly, the transfer function $v(B)$ contains a set of parameters delineating the relationship $Y_t = [\delta(B)]^{-1}\Omega(B)X_t$, between the endogenous variable Y_t and the exogenous variable X_t . The parameters of $\Omega(B)$ indicate the time delay of influence of the exogenous variable and the magnitude of its effects at various time lags, while the parameters of $\delta(B)$ specify the rate at which this influence damps out (Box and Jenkins, 1976, pp. 337-349).

The transfer function analysis begins by finding univariate noise models of each of the two time series Y_t and X_t , separately, using the standard autoregressive integrated moving averages (ARIMA or Box-Jenkins) method (Box and Jenkins, 1976; McCleary and Hay, 1980). In case either or both of the series are nonstationary, this must be corrected by appropriate differencing of the series. The second step of analysis is to tentatively identify the form of the transfer function relating the exogenous and endogenous variables.

The transfer function is determined from the cross-correlation function (cross-correlation between the two variables at various lags) if the exogenous variable has a white noise structure; in case it does not, both series are filtered by the ARIMA model for the exogenous variable prior to calculating the cross-correlation function. The third step of analysis is to estimate the parameters of the tentatively identified transfer function and use the residuals from this model to identify an ARIMA model for the noise component N_t of the endogenous variable. The fourth step is to estimate jointly the parameters of the transfer function and noise model, and the final step is to diagnose the adequacy of the noise model (whether the residuals of the endogenous variable differ significantly from a series of independent random disturbances; Ljung and Box, 1978) and the adequacy of the transfer function (whether the residuals of the endogenous variable are no longer cross-correlated with the prewhitened exogenous variable; Box and Jenkins, 1976).

Results

The endogenous and exogenous variables both required differencing at lag one week to achieve stationarity. The noise model N_{xt} for the differenced exogenous variable included first and second order moving average parameters, that is $N_{xt} = (1 - \theta_1 B - \theta_2 B^2) a_{xt}$, where θ_i are moving average parameters, $B^n a_t = a_{t-n}$ (a backwards shift operator), and N_{xt} and a_{xt} are the noise model and a series of independent and randomly distributed disturbances, respectively, for the differenced exogenous series. Both parameters were statistically significant ($\theta_1 = .417$, $t(102) = 4.47$, $p < .001$; $\theta_2 = .328$, $t(102) = 3.46$, $p < .001$). Diagnostic tests on this model indicated it to be adequate. The residuals to the model showed no significant autocorrelations or partial autocorrelations at lags 1-36. In addition, the Ljung-Box test for the joint significance of observed residual autocorrelations (Ljung and Box, 1978) was $Q = 27$ for lags 1-36; this statistic is distributed as $\chi^2(34)$, $p > .75$, consistent with the null hypothesis of white noise random disturbances.

The second step of analysis was to tentatively identify the form of the transfer function by filtering the endogenous series (violent crimes) by the above model for the exogenous series, and by examining the cross-correlation function of the filtered series with the prewhitened exogenous series. The resulting cross-correlation function had one significant term in the interval from lag -7 to lag 7; this was at lag one, in the predicted direction, $r_{xy} = -.20$, $t(102) = -2.0$, $p < .025$, one-tailed. Cross-correlations at lags two and three also trended in the same direction, suggesting a lag one effect that damps out thereafter. This is expressed by the transfer function model $Y_t(1-B) = (\omega_1 B)(1 - \delta_1 B)^{-1} X_t(1-B) + N_t$, relating the endogenous and exogenous variables, where $(1-B)$ is the differencing operator, ω_1 is the lag one effect of the exogenous variable and δ_1 is a decay parameter for the effect.

The parameters of the above transfer function model were then estimated, and the residuals to this model examined in order to identify the noise model N_t . The residuals were modeled well by a first order moving average process, suggesting the noise model $N_t = (1 - \theta_1 B)a_t$, where terms are as previously defined.

The parameters of the transfer function and noise model were then jointly estimated. All parameters were statistically significant at the .01 level ($\theta_1 = .716$, $t(100) = 10.25$; $\omega_1 = -.127$, $t(100) = -2.52$, one-tailed; $\delta_1 = .569$, $t(100) = 2.94$). In addition, diagnostic tests on the residuals to the model indicated that it was appropriate. There were no significant autocorrelations or partial autocorrelations at lags 1-36, and the Ljung-Box test of joint significance of autocorrelations of the residuals was consistent with the hypothesis of white noise random disturbance ($Q = 31$, distributed as $\chi^2(33)$, $p > .50$). The appropriateness of the transfer function model is indicated by the fact that there were no significant cross-correlations (exceeding two standard errors from lags 0 to 36 with either variable leading) between the prewhitened exogenous series and the residuals to the full transfer function model.

The parameter estimates support a transfer function with an immediate (lag one) effect of $-.127$ and a decay rate of $.569$. This means that the immediate effect of increasing the number of TM-Sidhi program participants by one is a decrease of $.127$ violent crimes the following week, with a further decrease each subsequent week that is 57 per cent of the previous week's decrease. The "steady state gain" or asymptotic cumulative level of equilibrium of the endogenous variable for an increase of one in the exogenous variable is given by $g = \omega_1(1 - \delta_1)^{-1}$ (Box and Jenkins, 1976, p. 346), or in the present case a cumulative decrease of $.295$ violent crimes from an increase of one participant in the TM-Sidhi program. From the first year to the second year of the two years of data analyzed here (52 weeks for year one, 53 for year two), the mean number of weekly TM-Sidhi program participants increased by 81.96, from 280.02 to 361.98. When the steady state gain is multiplied by 81.96, this gives a total decrease of 24.18 weekly violent crimes as estimated due to the increase of the group, a decrease of 9.04% from the average weekly total of 267.44 violent crimes during the first year of the study. The average weekly total for the second year was 235.89, a decrease of 31.55 violent crimes or 11.80%. This suggests that 76.6% of the observed decrease in violent crimes in the District over the two years can be attributed to the exogenous variable as a result of this analysis.

Discussion

Transfer function analysis of weekly data supported the hypothesis of a causal relationship between participation in the group practice of the Transcendental Meditation and TM-Sidhi program and decreased violent crimes

in the District of Columbia. Because of the use of time series analysis procedures, this relationship cannot be spurious due to cyclical or nonstationary time dependence among the observations.

The following alternative hypotheses for decreased crime are frequently cited and must be considered: (1) reduced percentage of the population in the young adult ages (e.g., 18-21), the group that statistically commits a higher proportion of violent crimes (Fox, 1978); (2) an increase in neighborhood crime watch programs; (3) changes in police coverage (Fox, 1978; Webster, 1983).

Estimates of the population of the District of Columbia were available for the end of 1981 and 1983 for the age group 18-24 ("Metro Area," 1982, 1984). During this period, the population in this age range decreased 3.2 per cent from 91,367 to 88,431, and from 14.9 to 14.3 per cent of the total District population. However, the distribution of a population in various age ranges changes gradually, and thus this variable cannot account for the weekly fluctuations in violent crime totals negatively associated with changes in the number of participants in the TM-Sidhi program.

The neighborhood crime watch program has been aggressively promoted by the Metropolitan Police Department of the District of Columbia since March 1981. By March, 1984, 25% of the households in the District of Columbia had joined the program (R. Burton, Metropolitan Police Department of the District of Columbia, personal communication, March 6, 1984). The structure of the program is as follows. When 60% of a block's residents are willing to attend a block meeting, two police officers attend the meeting to discuss the role of citizens in crime prevention. A film on burglar-proofing residences is shown and residents are encouraged to report any suspicious activity to the police. A sign is then posted which says: "Warning, Neighborhood Watch Area. This neighborhood reports all suspicious activity to the Metropolitan Police." Once a program is instituted, no further organizing activity for the area residents occurs beyond what they may spontaneously generate among themselves.

A Seattle study found a temporary initial decrease in crime rate in neighborhood watch areas that was no longer evident at a follow-up assessment after one and one-half years (Cirel, Evans, McGillis, and Whitcomb, 1977). In an evaluation of the effectiveness of the Washington, D.C. program, Henig (1984) noted that neighborhood watch programs were more likely to be formed in prosperous and already low-crime areas of the city. Although watch programs made residents feel more secure, he found no evidence of a greater or faster crime decrease in watch areas than in non-watch areas. These results, and the facts that the present study covered a two-year interval and assessed weekly variations in violent crime, indicate that the crime watch program is not a viable alternative hypothesis to the results found here.

A final alternative factor to be considered is improved police coverage as a possible cause of decreased violent crime in the District of Columbia. District

police officials noted that there was no increase in the size of the police force from 1981 to 1983 (Sgt. Olszewski, personal communication, November 20, 1983). Moreover, research indicates that factors such as police expenditures, size of police force, arrest rate, and concentration of police on making robbery arrests are positively related to robbery rate (Jacob and Rich, 1981; Wilson and Boland, 1978). Increased police attention may lead to increased reporting of crime (Jacob and Rich, 1981); alternatively it could be the result of increased crime (Fox, 1978). In any case, given the stability of police coverage during the period of the study it is unlikely that police coverage would covary with the size of the group of TM-Sidhi participants on a weekly basis. Thus, police coverage can logically be eliminated as an alternative explanation of the observed decrease in violent crime.

General Discussion

The results of the three studies are consistent with the hypothesis that the practice of the Transcendental Meditation program by a small proportion of the population of a city in their own homes, or the group practice of the Transcendental Meditation and TM-Sidhi program by numbers exceeding the square root of one percent of the population, has an influence of improved quality of life in the entire society. This phenomenon, termed the Maharishi Effect in previous research, has been measured in the present case in terms of decreased rates of crime and incidence of violent crime. The observed relationship does not appear to be spurious, in light of the power of the methods used to assess its presence.

It is useful to discuss two general issues raised by these results, one theoretical and one practical. The primary theoretical question regarding these findings is what mechanism might be responsible for them. We assume at the outset that those who begin the TM program are not criminals whose behavior improved as a result of the program, at least in numbers large enough to explain the current effects. Those who begin the TM program are reported to be a broad cross-section of society (Bloomfield, Cain, Jaffe, and Kory, 1975, p. 36); nevertheless, it is unlikely that those prone to crime are attracted to a program for self development such as the TM program. Even if criminals began the TM program in proportion to their number in the general population, then reduced crime among this small fraction of the already small group of TM and TM-Sidhi program participants could not account for the magnitude of effect found here in entire urban areas.

Assuming, then, that an influence spreads to others in the society from those involved in the practices studied here, one class of possible explanations for the effect found in the present studies is behavioral, and another is the concept of a field relating to social behavior. Current models of social

influence in social psychology and sociology are behavioral in that they require the direct interaction of individuals in order for an influence to be transmitted. None of these models can reasonably account for the present results and those of similar studies reported here. The individual or group participants did not change their routines of daily activity other than to withdraw from social interaction for two periods of time each day for participation in the mental techniques.

If these individuals did not change their routines of behavior, then one might suggest that a behavioral influence could be communicated by a change in the quality of their behavior. That is, since results of research on those participating in the Transcendental Meditation and TM-Sidhi program demonstrate improved clarity of mind, reduced stress, and greater emotional and physical health, it could be proposed that as a result of their more positive and less stressful interactions with others during the day, a "ripple effect" might be created through which this influence would be communicated to a larger and larger range of the population through the subsequent interactions of those they meet. Such an effect, however, is extremely unlikely given all that is currently known about social influence and the intractability of social problems such as crime. The participants in the Transcendental Meditation and TM-Sidhi program were mostly employed persons, housewives, or students, and the possibility of their contact with the criminal population, directly or through mutual acquaintances, is minimal. Even if such contact were posited, the size of the group of TM-Sidhi program participants, in the third study, for example, was only about ten percent of the size of the District of Columbia police force. If police officers patrolling crime-prone areas cannot be shown systematically to have a deterrent effect on crime, then the alternative hypothesis that behavioral interaction is responsible for the observed results is clearly most unlikely.

Although the data cannot be explained by a behavioral interaction model, they are consistent with the concept of a field effect in society. Since the independent variable was participation in Maharishi's technology of consciousness, the proposal that consciousness has a fundamental field character is supported by the present findings. If so, one might ask what is the relationship between the proposed field of pure consciousness and the known physical fields. It does not seem that the field of pure consciousness is directly linked to an isolated physical field. The only one of the known physical fields that has a substantive effect on behavioral and brain processes is the electromagnetic field; even extremely weak electromagnetic fields of some types can influence neurophysiological and behavioral processes (Adey and Bawin, 1977; Wever, 1977). However, in spite of recent speculations (Tourenne, 1985), it is generally understood that electromagnetic fields of sufficient strength to influence behavioral parameters could not be generated by neurophysiological processes such as those associated with mental techniques;

this is particularly true given the long-range influence found in the present studies. Hagelin (1987), a leader in the development of unified quantum field theories in physics, has proposed that long-range field effects found in such social research support an explanation in terms of the unified field itself, rather than one of the isolated physical fields. This is consistent with Maharishi's elaboration of the Vedic perspective, which states that the field of pure consciousness is the unified field of the laws of nature (Maharishi Mahesh Yogi, 1986). A more detailed discussion of the proposed relationship of consciousness and the unified field is found in Dillbeck et al. (1987).

The important practical implication of the present findings is that they suggest the possibility of reducing crime and improving the quality of life in society without disrupting the social system and without great expense. Although the present studies focused on crime as the dependent or endogenous variable, other studies have extended the measured influence of the Maharishi Effect to a wide range of social indicators, including holistic quality of life indices (Dillbeck et al., 1987; Orme-Johnson, Alexander et al., in press; Orme-Johnson, Gelderloos, and Dillbeck, in press). Additional research being prepared for publication assesses the effects of social interventions using the practice of the TM-Sidhi program by groups large enough to have an influence on an international scale; findings include reduced violence in trouble-spot areas during these periods (Alexander, Abou Nader, Cavanaugh, Davies, Dillbeck, Kfoury, and Orme-Johnson, in press; Orme-Johnson and Dillbeck, 1987). This research suggests that the wide variety of forms of violence and social turbulence may have a common origin, identified by Maharishi as stress in collective consciousness. It also indicates that the application of the technology investigated here could have far-reaching implications for reducing violence and supporting progress and harmony in society. These results thus warrant careful examination by policy makers and behavioral and social scientists.

References

- Adey, W.R., and Bawin, S.M. (1977). Brain interactions with weak electrical and magnetic fields. *Neuroscience Research Program Bulletin*, 15, 104-129.
- Alexander, C.N. (1982). Ego development, personality and behavioral change in inmates practicing the Transcendental Meditation technique or participating in other programs: A cross-sectional and longitudinal study. *Dissertation Abstracts International*, 43, 539B.
- Alexander, C.N., Abou Nader, T.M., Cavanaugh, K.L., Davies, J.L., Dillbeck, M.C., Kfoury, R.J., and Orme-Johnson, D.W. (in press). The effect of the Maharishi Technology of the Unified Field on the war in Lebanon: A time series analysis of the influences of international and national coherence creating assemblies. In R.A. Chalmers, G. Clements, H. Schenkluhn, and M. Weinless (Eds.), *Scientific research on the Transcendental Meditation and TM-Sidhi programme: Collected papers* (Vol. 4). Vlodrop, The Netherlands: MVU Press.
- Beasley, R.W., and Antunes, D.R. (1974). The etiology of urban crime: An ecological analysis. *Criminology*, 11, 439-461.

- Berkowitz, L. (1962). *Aggression: A social psychological analysis*. New York: McGraw-Hill.
- Bleick, C.R., and Abrams, A.I. (1987). The Transcendental Meditation program and criminal recidivism in California. *Journal of Criminal Justice*, 15, 211-230.
- Bloomfield, H.H., Cain, M.P., Jaffe, D.T., and Kory, R.B. (1975). *TM: Discovering inner energy and overcoming stress*. New York: Dell.
- Borland, C., and Landrith III, G.S. (1976). Improved quality of city life through the Transcendental Meditation program: Decreased crime rate. In D.W. Orme-Johnson and J.T. Farrow (Eds.), *Scientific research on the Transcendental Meditation program: Collected papers* (Vol. 1, pp. 639-648). Rheinweiler, West Germany: MERU Press.
- Box, G.E.P., and Jenkins, G.M. (1976). *Time series analysis: Forecasting and control*. San Francisco: Holden-Day.
- Brooks, J.S., and Scarano, T. (1985). Transcendental Meditation in the treatment of post-Vietnam adjustment. *Journal of Counseling and Development*, 65, 212-215.
- Cirel, P., Evans, P., McGillis, D., and Whitcomb, D. (1977). *Community crime prevention*. Seattle, Washington. Washington, D.C.: National Institute of Law Enforcement and Criminal Justice.
- Cloward, R.A., and Ohlin, L.E. (1960). *Delinquency and opportunity*. New York: Free Press.
- Cressey, D.R. (1978). Criminological theory, social science, and the repression of crime. *Criminology*, 16, 171-191.
- Dillbeck, M.C. (1977). The effect of the Transcendental Meditation technique on anxiety level. *Journal of Clinical Psychology*, 33, 1076-1078.
- Dillbeck, M.C. (1982). Meditation and flexibility of visual perception and verbal problem solving. *Memory & Cognition*, 10, 207-215.
- Dillbeck, M.C. (1983). Testing the Vedic psychology of the Bhagavad-Gita. *Psychologia*, 26, 232-240.
- Dillbeck, M.C., Cavanaugh, K.L., Glenn, T., Orme-Johnson, D.W., and Mittlefehldt, V. (1987). Consciousness as a field: The Transcendental Meditation and TM-Sidhi program and changes in social indicators. *The Journal of Mind and Behavior*, 8, 67-104.
- Dillbeck, M.C., Landrith III, G.S., and Orme-Johnson, D.W. (1981). The Transcendental Meditation program and crime rate change in a sample of forty-eight cities. *Journal of Crime & Justice*, 4, 25-45.
- Dillbeck, M.C., and Orme-Johnson, D.W. (1987). Physiological differences between Transcendental Meditation and rest. *American Psychologist*, 42, 879-881.
- Elliot, M.S., and Merrill, F.E. (1961). *Social disorganization*. New York: Harper and Bros.
- Fox, J.A. (1978). *Forecasting crime data*. Lexington, Massachusetts: Lexington Books.
- Frew, D.R. (1974). Transcendental Meditation and productivity. *Academy of Management Journal*, 17, 362-368.
- Hagelin, J. (1987). Is consciousness the unified field? *Modern Science and Vedic Science*, 1, 28-87.
- Henig, J. (1984). *Citizens against crime: An assessment of the neighborhood watch program in Washington, D.C.* Occasional paper No. 2, George Washington University, Center for Washington Area Studies, Washington, DC.
- Jacob, H., and Rich, M. (1981). The effects of the police on crime: A second look. *Law and Society Review*, 15, 109-122.
- Kenny, D.A. (1975). Cross-lagged panel correlation: A test for spuriousness. *Psychological Bulletin*, 82, 887-903.
- Kenny, D.A. (1979). *Correlation and causality*. New York: Wiley.
- Ljung, G.M., and Box, G.E.P. (1978). On a measure of lack of fit in time series models. *Biometrika*, 65, 297-303.
- Locascio, J.J. (1982). The cross-lagged correlation technique: Reconsideration in terms of exploratory utility, assumption specification, and robustness. *Educational and Psychological Measurement*, 42, 1023-1036.
- Maharishi European Research University. (1979). *New horizons in criminology*. Rheinweiler, West Germany: MERU Press.
- Maharishi Mahesh Yogi. (1969). *On the Bhagavad-Gita*. Baltimore: Penguin.
- Maharishi Mahesh Yogi. (1977). *Creating an ideal society*. Rheinweiler, West Germany: MERU Press.
- Maharishi Mahesh Yogi. (1978). *Enlightenment and invincibility*. Rheinweiler, West Germany: MERU Press.

- Maharishi Mahesh Yogi. (1986). *Life supported by natural law*. Washington, D.C.: Age of Enlightenment Press.
- Maltz, M.D. (1977). Crime statistics: A historical perspective. *Crime & Delinquency*, 23, 32-40.
- McCleary, R., and Hay, R.A., Jr. (1980). *Applied time series analysis for the social sciences*. Beverly Hills, California: Sage Publications.
- Merton, R.K. (1957). *Social theory and social structure*. New York: Free Press.
- Metro area, county, and city data listed by states. (1982). *Sales & Marketing Management*, 129(2), C-42.
- Metro area, county, and city data listed by states. (1984). *Sales & Marketing Management*, 133(2), C-42.
- Mladenka, K.R., and Hill, K.Q. (1976). A re-examination of the etiology of urban crime. *Criminology*, 13, 491-506.
- Natsoulas, T. (1981). Basic problems of consciousness. *Journal of Personality and Social Psychology*, 41, 132-178.
- Orme-Johnson, D.W. (1987). Medical care utilization and the Transcendental Meditation program. *Psychosomatic Medicine*, 49, 493-507.
- Orme-Johnson, D.W., Alexander, C.N., Davies, J.L., Chandler, H.M., and Larimore, W.E. (in press). International peace project in the Middle East: The effects of the Maharishi Technology of the Unified Field. *Journal of Conflict Resolution*.
- Orme-Johnson, D.W., and Dillbeck, M.C. (1987). The effects of large assemblies practicing the Maharishi Technology of the Unified Field on international conflicts, the world economy, traffic fatalities, and notifiable diseases. (Prepublication manuscript, Maharishi International University.)
- Orme-Johnson, D.W., and Farrow, J.T. (Eds.). (1976). *Scientific research on the Transcendental Meditation program: Collected papers*. Vol. 1. Rheinweiler, West Germany: MERU Press.
- Orme-Johnson, D.W., Gelderloos, P., and Dillbeck, M.C. (in press). The effects of the Maharishi Technology of the Unified Field on the U.S. quality of life (1960-1984). *Social Science Perspectives Journal*.
- Patanjali. (1978). *Yoga sutras* (R. Prasada, Trans.). New Delhi: Oriental Books Reprint Corporation. (Original work published 1912)
- Pelletier, K.R. (1974). Influence of Transcendental Meditation upon autokinetic perception. *Perceptual and Motor Skills*, 39, 1031-1034.
- Principal Upanishads*. (1974). (S. Radhakrishnan, Trans.) New York: Humanities Press.
- Quinney, R. (1966). Structural characteristics, population areas, and crime rate in the United States. *Journal of Criminal Law, Criminology, and Police Science*, 57, 45-52.
- Rogosa, D. (1980). A critique of cross-lagged correlation. *Psychological Bulletin*, 88, 245-258.
- Rosenthal, R., and Rubin, D.B. (1982). A simple, general purpose display of magnitude of experimental effect. *Journal of Educational Psychology*, 74, 166-169.
- Schmitt, R.C. (1957). Density, delinquency, and crime in Honolulu. *Sociology and Social Research*, 41, 274-276.
- Shecter, H.W. (1978). A psychological investigation into the source of the effect of the Transcendental Meditation technique. *Dissertation Abstracts International*, 38, 3372B-3373B.
- Skogan, W.G. (1977). Dimensions of the dark figure of unreported crime. *Crime & Delinquency*, 23, 41-50.
- Spector, P.E. (1975). Population density and unemployment: The effects on the increase of violent crime in the American city. *Criminology*, 12, 399-401.
- Sperry, R.W. (1987). Structure and significance of the consciousness revolution. *The Journal of Mind and Behavior*, 8, 37-66.
- Sudarshan, E.C.G., and Mukunda, N. (1974). *Classical dynamics*. New York: Wiley.
- Sutherland, E.H., and Cressey, D.R. (1978). *Criminology*. New York: Lippincott.
- Tourenne, C. (1985). A model of the electric field of the brain at EEG and microwave frequencies. *Journal of Theoretical Biology*, 106, 495-507.
- U.S. Bureau of the Census. (1972). *City and county data book*. Washington, D.C.: U.S. Government Printing Office.
- U.S. Bureau of the Census. (1977). *Population estimates and projections*. (Series P-25, No. 649-698). Washington, D.C.: U.S. Government Printing office.
- U.S. Bureau of the Census. (1985). *Statistical abstract of the United States, 1986*. Washington,

- D.C.: U.S. Government Printing Office.
- U.S. Department of Justice. (1964-1979). *Federal Bureau of Investigation uniform crime reports: Crime in the United States*. Washington, D.C.: U.S. Government Printing Office.
- U.S. Public Health Service. (1967-1978). *Vital statistics of the United States*. Washington, D.C.: U.S. Government Printing Office.
- Webster, D. (1983). U.S. crime down sharply in 1983. *The Washington Post*. October 24, p. A1.
- Wever, R. (1977). Effects of low-level low-frequency fields on human circadian rhythms. *Neuroscience Research Bulletin*, 15, 39-45.
- Wilson, J., and Boland, B. (1978). The effect of the police on crime. *Law and Society Review*, 12, 367-390.