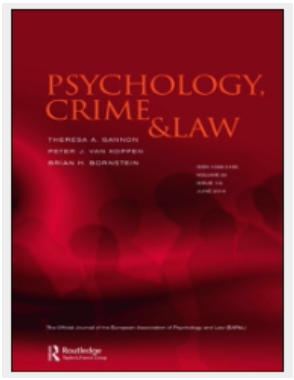

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The maharishi effect: A model for social improvement. Time series analysis of a phase transition to reduced crime in merseyside metropolitan area

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Abstract:

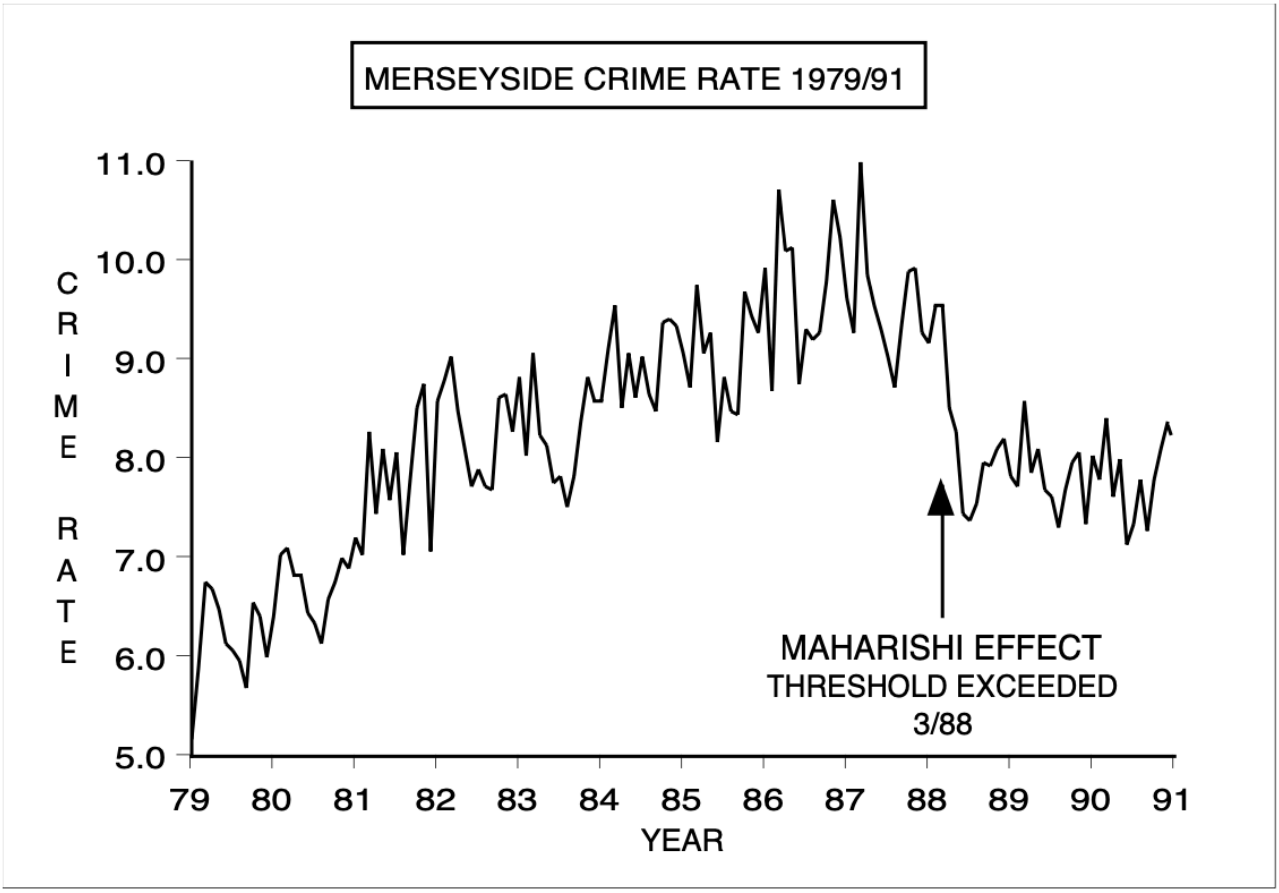
Time series analysis was used to test the hypothesis that Merseyside crime rate was reduced by a group practicing the Maharishi Mahesh Yogi's Transcendental Meditation and TM-Sidhi programme. Previous research suggests that a phase transition to increased orderliness as evidenced by reduced crime rate should occur when the group size approaches the square root of 1% of the total population. Analysis of Merseyside monthly crime data and coherence group size from 1978 to 1991 shows that a phase transition occurred during March 1988 with a 13.4% drop in crime when the group size first exceeded the 1% or Maharishi Effect threshold ($p < 0.00006$). Since then, Merseyside crime rate has remained steady in contrast to the national crime rate which has increased by 45%. In 1987 Merseyside had the third highest crime rate of the eleven largest Metropolitan Areas in England and Wales; by 1992 it had the lowest crime rate, 40% below levels predicted by the previous behavior of the series. There were 255,000 less crimes in Merseyside from 1988 to 1992 than would have been expected had Merseyside continued to follow the national crime trend. Home Office figures indicate savings to Merseyside could exceed £1250 million for the five year period. Demographic changes, economic variables, police practice, and other factors could not account for the changes.

Method and Data

Merseyside includes the city of Liverpool (population 1.5 million) with a history of high crime. In 1975, the Liverpool TM instructor Mrs Patricia Stone wrote to the Lord Mayor offering to reduce crime by 16% and requesting financial help to teach the TM technique to 1% of the population. Mrs Stone has since taught the TM technique to over 5000 Merseyside residents. Maharishi European Sidhaland, at nearby Skelmersdale, was founded in 1980 to provide an ideal quality of life through the daily practice of the Maharishi TM-Sidhi programs. By 1991 it had grown to 365 members along with a group

meditation facility—The Maharishi Golden Dome—opened in March 1988. At the opening ceremony, leaders of the community appeared on television predicting reduced crime.

Figure 1: Merseyside Monthly Crime Rate 1979/91
(Total recorded crime per 1000 population per month)



Crime data: Merseyside Police supplied monthly reported crime totals excluding category 52B from 1979 to Sept. 1991, which were converted to a time series of crimes/ 1000 population (Figure 1). The Home Office supplied corresponding reported crime totals for England and Wales.

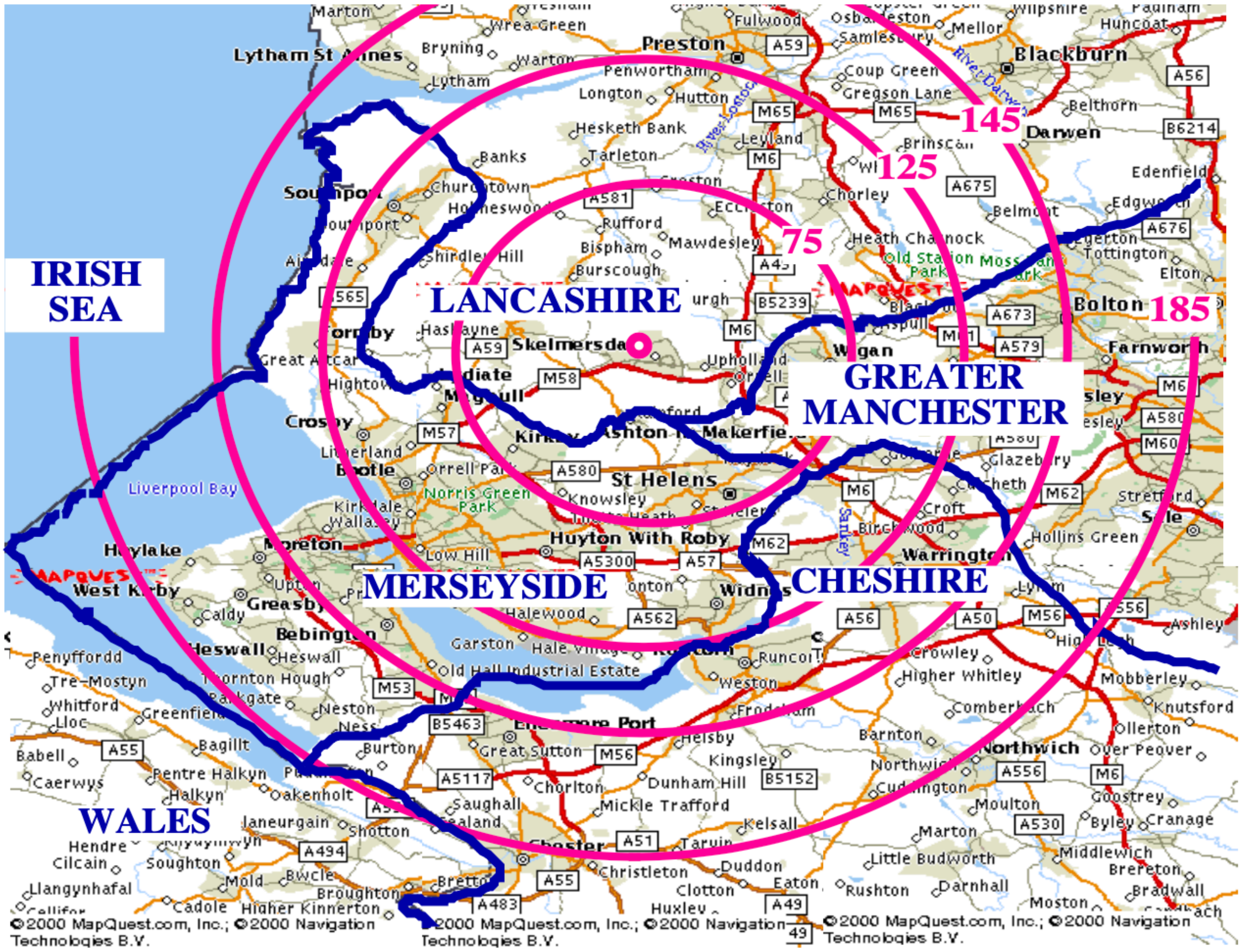
Transcendental Meditation and TM-Sidhi program participation data: There are two contributing factors to coherence (a measure of participation in the Transcendental Meditation and TM- Sidhi programs). Firstly, monthly totals of Merseyside residents instructed in the TM program from 1980 to 1991. Secondly, daily numbers of individuals participating in the group TM-Sidhi program in Skelmersdale from September 1980 to September 1991, which were averaged for each month. Skelmersdale is close to Merseyside, Greater Manchester, Lancashire, and Cheshire (Figure 2). Therefore, following the practice of other studies, a model was necessary to accurately project the coherence effect for Merseyside in comparison to neighboring counties and to combine the effect contributed by Yogic Flyers and Transcendental Meditation participants.

In the field theory of consciousness, levels of collective consciousness - family, community, city, and national - are a reflection of the individual consciousness of their members. A unit of collective consciousness is a broadly homogeneous, large, cultural and social group, often defined by geographic and political boundaries. Each unit of

collective consciousness will have a tendency for shared or homogenized trends throughout the whole area reflected in the level of social indicators. Maharishi Effect theory predicts that phase transition effects of reduced crime will become apparent when the threshold is passed for the whole unit.

The effect was modeled as a radial field acting on the four adjacent counties. Concentric circles with radii at 1.5kms intervals centered on Skelmersdale were drawn (Fig 2) The total population captured by each circle was counted using a population map and the Merseyside indicated the percentage of the Maharishi Effect threshold reached for any given number at the Dome (%MET).

Figure 2 The Maharishi Effect in Merseyside and surroundings—Geographical setting and population distribution. Numbers are the square root of 1% of the population captured by each circle centred on Skelmersdale, Lancashire, UK



This method indicates that Merseyside should be the first beneficiary of coherence in Skelmersdale. At a radius of 15.5 Kms 77% of the Merseyside threshold can be accounted for by 138 TM-Sidhas attending group meditation sessions in Skelmersdale. The same group simultaneously generates only 20% of the Lancashire threshold, 10% for Cheshire, and 15% for Manchester. Theory predicts that 1% practicing TM at home will produce an effect equivalent to the square root of 1% practising the advanced TM-Sidhi programme in a group.

So the effect of the individuals practicing meditation in Merseyside was added to %MET on a linear scale. For each month a coherence index was calculated:

Maharishi Effect Threshold Index (%MTI) = Effect of TM-Sidhi + Effect of Merseyside
Group meditators @ 1%

= %MET + 10000*N/POP

N = Number instructed in TM in Merseyside to date; POP = population of Merseyside.

Table 1: Maharishi Effect Threshold Index (%MTI) 1980-91 (March Values)

Year:	'80	'81	'82	'83	'84	'85	'86 '	87	**'88**	**'89**	**'90**	**'91**
%MTI:	11	33	63	52	50	36	33	52	**101**	**98**	**103**	**104**

Thus a time series for coherence was obtained (%MTI) in which a value of 100 is the theoretical threshold for a phase transition (Table 4). This threshold was first surpassed in March 1988 when the Maharishi Golden Dome was opened. For a physical phase transition the influence is almost zero before threshold and operational at and above threshold. Therefore, following the practice of earlier studies, the coherence is modeled as a step function with a binary intervention variable, value 0 prior to March 1988 and value 1 for March 1988 and subsequent months when the threshold was exceeded. (March values are reported in Table 1. March 1988 was 50% higher than the February 1988 as the new facility for group practice opened at that time.)

Time series intervention analysis

The effect of the thresholded coherence index on Merseyside crime was assessed during 1979 to 1991 using the autoregressive integrated moving averages (ARIMA) methodology of Box and Jenkins Time series analysis controls for seasonal effects and cyclical trends in the data so that an accurate measure of the timing, size and form of the effect of an intervention can be assessed.

First the Merseyside crime series (Figure 1) was assessed for the pre-intervention period. Inspection of the autocorrelation function (ACF) indicated a non-stationary process so the series was first differenced to induce stationarity. Visual inspection shows that the series exhibits strong seasonality, but the series did not need seasonal differencing. The pre-intervention series was adequately modeled by: $Y_t = C + N_t$ where Y_t is the dependent series, C is a constant, and N_t is the noise model $(1-\theta B)(1-\phi_{12}B^{12})^{-1}(1-\phi_{24}B^{24})^{-1}a_t$ which serves as a null hypothesis, where a_t is a series of independent random disturbances, $\phi(B)$ and $\theta(B)$ are autoregressive (AR) and moving average (MA) parameters respectively, at specified time lags, and B is the backshift operator defined by $Y_{t-1} = (B)Y_t$.

This non-intervention model could not fully account for the whole series when the post-intervention period was included, because of unacceptably high serial correlations in model residuals. The intervention model $Y_t = C + \omega_i I_t + N_t$, where ω_i is the intervention effect to be estimated at lag i, and I_t is the independent binary intervention series, was however able to model the whole series.

Because the intervention effect was very robust and a number of seasonal noise models were found adequate, the Akaike "Information Criterion" (AIC) was used to choose among adequate noise models (571). The same mixed MA(1), AR(12) X AR(24) noise model as above was indicated as the most satisfactory. The intervention was tested to six monthly lags and only lag zero proved significant. The intervention was run with lag 0 and 1, and lag 1 was again insignificant. Final parameter estimates of the noise model and intervention at lag zero only are reported in Table 5.

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Diagnostic criteria indicated the final model to be acceptable. All polynomial roots were well outside the unit circle indicating model stationarity. No autocorrelations or partial autocorrelations were significant at lags 1-36. The Ljung-Box test for joint significance of residual autocorrelations was acceptable, Q = 5.9, 16.5, & 26.2 at 12, 24, & 36 lags respectively. For lag 36, $\chi^2(31) = 26.2$, $p > 0.6$, consistent with the assumption of randomly distributed disturbances. The effective number of observations was 141. The R^2 goodness of fit was a very adequate 0.61.

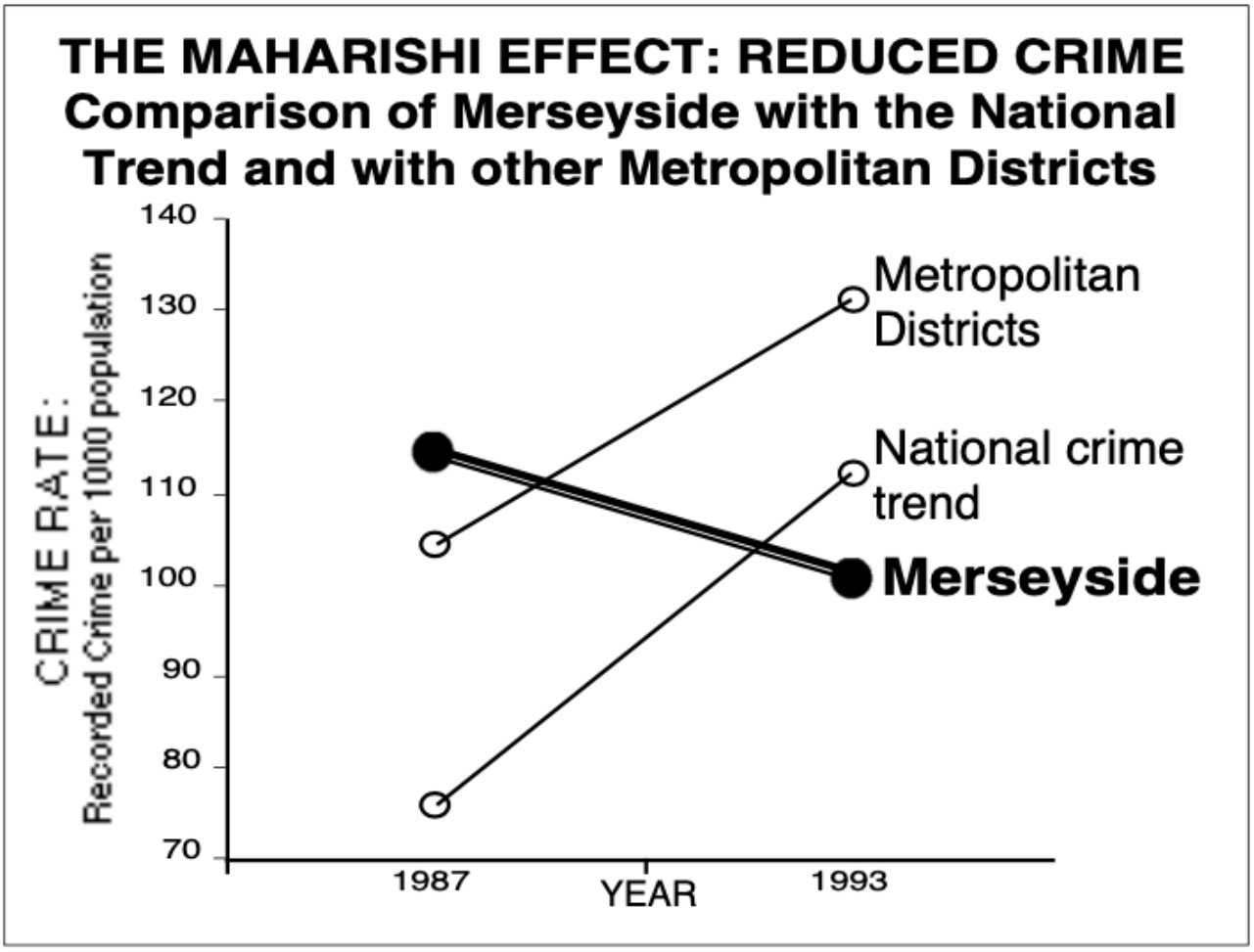
As a further test the model was run with the intervention set at one month prior to the threshold and proved not significant. As expected, if the model was run with the intervention set at one month later than threshold it proved significant but at a reduced level with decreased intervention parameter value and increased residuals and Q statistic.

Table 5: Intervention analysis (1979-1991) final parameter estimates

Parameter	Value	t(141)	p< (one tailed)
C	.0278	.88	0.19
w_0	−1.2202	−4.68	0.000056
θ_1	.6501	10.18	
ϕ_{12}	.3925	4.55	
ϕ_{24}	.3897	4.53	

The lag zero intervention parameter was very significant at the $p < 0.00006$ level, its value (-1.22) indicating that the intervention accounted for a 13.4% decline in crime compared to 1987 crime rate levels. This accounts for 85% of the total decline in crime rate levels for 1987/90. The seasonal components at 12 and 24 months are consistent with the visual appearance of the series and may be accounted for by patterns of holiday behavior, weather and other seasonal influences. The constant term (0.0278) approximates the average monthly increase in crime rate that is apparent in the pre-intervention period (Fig 1).

The transition in Merseyside crime is unique in the nation. An analysis of % crime rate change for 1987/90 and 1987/92 in the 42 Police Districts of England and Wales shows that Merseyside alone had decreased crime. In each case Merseyside lay more than 3 standard deviations from the mean ($p < 0.0006$, one-tailed *t*-test). By 1992, Merseyside crime was more than 40% below the level that it would have reached had it continued to follow the national trend as before. The March 1988 reduction in Merseyside crime (Figure 1) was not evident in the National crime data, nor was the continuing trend of low Merseyside crime figures evident in National data or other metropolitan areas (Figure 3) when the annual crime rate per 1000 population from 1987 was compared to 1993).



Other factors affecting crime rate

Merseyside is justifiably proud of its new low-crime status; articles have appeared with headlines such as "Guess where in Great Britain the crime rate is actually falling?". In the introduction to his 1990 annual report, Merseyside Chief Constable, Jim Sharples, commented that reduced crime "*cannot be viewed simply as a barometer of the success or failure of a police force, since many factors beyond the control of the police contribute to crime rate*". Policemen, probation officers, Home Office statisticians, and academic reviewers were interviewed: their questions have been carefully analyzed and summarized in brief below.

Crime is understood to be related to consumption or retail sales[1]. Unemployment is the only consumption-related variable available as a time series for local areas. Merseyside has consistently had a higher unemployment rate than the national rate, and the analysis of this data ruled out changes in economic factors as the cause of the unusual crime trend in Merseyside since similar unemployment trends were apparent in Merseyside and the nation throughout the intervention period, whereas the crime trends were divergent.

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[1] FIELD, S.: 'Trends in crime and their interpretation - A study of recorded crime in post-war England and Wales', Home Office Research Study 119, HMSO Books, London 1990

There have been non-uniform population movements in the five Merseyside boroughs. Primarily there has been a steady exodus from the inner city boroughs of Liverpool and Knowsley of 1% p.a. during the 1980's. The three outer boroughs have maintained a constant population. If decreases in population densities were the driving factors behind crime changes, significant non-uniform crime rate changes within the city boroughs would be seen. Table 6 shows that this is not the case.

Table 6: Annual percent change in total recorded crime per 1000 population Inner city versus Merseyside 1984 - 1990

Year	'84	'85	'86	'87	**'88**	**'89**	**'90**
Inner city area	9.1	1.1	5.3	-4.8	**-15.6**	**-6.1**	**0.4**
Merseyside total	9.1	0.6	7.2	-2.2	**-13.5**	**-5.8**	**0.6**

Furthermore, although the percentage of 15-30 year olds in Merseyside fell from 24% to 22% between 1981 and 1991 similar falls in other metropolitan districts such as Tyneside were not accompanied by a fall in crime.

Some felt that increased mobility of criminals might have led to increased crime outside the boundaries of crime-wary Merseyside. However, the counties adjacent to Merseyside had significantly lower crime increases than the rest of England and Wales for 1987/90 (+6% and +20% respectively).

A significant amount of crime is related to the economic needs of drug abusers. A successful drug rehabilitation program could be expected to have a positive impact on crime rate. However, expansion of the numbers being treated at the Liverpool Drug Dependency Clinic did not take place until July 1988, too late to account for the March 1998 fall in crime.

Home Office officials wrote to me that "recent percentage changes in Merseyside crime lie within the range of recorded Metropolitan crime rate changes". This is not the case. Whilst Merseyside had the third highest crime rate in the nation in 1987, by 1992 it had the lowest ranking among all the major urban areas (Figure 3). Table 7 shows that Merseyside had a decreasing percentage of Metropolitan crime from 1988 onwards.

Table 7:
Merseyside recorded crime expressed as a percentage of total Metropolitan crime in England and Wales 1984 - 1990.

Year	'84	'85	'86	'87	**'88**	**'89**	**'90**
Mersey as a % of Metro Crime	7.4	7.2	7.3	7.2	**6.6**	**6.0**	**5.4**

It was suggested that it would strengthen the results if data came from more than one police authority. West Lancashire police subdivision is centered on Skelmersdale. Annual divisional recorded crime figures were obtained from the Lancashire Police. In 1984 West Lancashire contained 7.6% of the population of Lancashire and accounted for 7.1% of

the reported crime. By 1990 crime had fallen to 5.4%. The most significant change occurred in 1988 when it fell from 7.0% to 5.8% (Table 8), the same year as the Merseyside fall. The similarity between the two independently recorded series from Merseyside (Table 7) and West Lancashire (Table 8) provides additional corroboration of our analysis.

Table 8:
West Lancashire recorded crime expressed as a percentage of Lancashire crime 1984-1990

Year:	'84	'85	'86	'87	**'88**	**'89**	**'90**
West Lancs as % of Lancs:	7.1	7.0	7.1	7.0	**5.8**	**5.6**	**5.4**

The British Crime Survey indicates that incomplete reporting and recording mean that only 30% of crimes end up in police records. 'Burglaries with loss' and 'thefts of vehicles' are the most likely categories of crime to be recorded. An analysis of these most reliable crime categories in Merseyside shows a consistent picture of crime reduction lending strong support to our conclusions. For March and April 1988 burglary decreased by 19% and motor vehicle theft decreased by 14% when compared to March and April 1987. Total violent crime decreased by 9%.

Merseyside Police District is justifiably proud of its performance and crime prevention programs since 1988. However they were unable to point to any unique features of their efforts that were not also pursued with little effect elsewhere in England and Wales.

Finally, despite highly statistically significant results, could this be an improbable coincidence? Inevitable skepticism should not fly in the face of repeated demonstrations of effectiveness—the essence of the scientific method. This study is the 42nd replication of the Maharishi Effect findings. Moreover, the field theory of consciousness has been developed within an interdisciplinary theoretical framework that can enrich and extend the present paradigm of the social sciences.

The cost of crime

A UK Home Office Report[2] estimates the average cost of each crime is more than £5,000. If Merseyside had continued to follow the national trend of rising crime from 1988 to 1992 there would have been 255,000 more crimes than actually occurred, a saving of £1250 Million. Each individual attending the group sessions in Skelmersdale apparently saves Merseyside £3,000 in reduced crime costs for each hour spent quietly practicing the advanced TM-Sidhi program. While some of these savings are theoretical, as changes in government expenditure will lag behind crime changes, the majority are very real. These include reduced costs of courts, prisons, insured and uninsured losses, damage, compensation, etc.

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[2] HOME OFFICE STANDING CONFERENCE ON CRIME PREVENTION: 'Report of the working group on the costs of crime', HMSO Books, London, 1988.

Conclusion

The study of consciousness is assumes a central role in modern physics. It is particularly prominent in measurement theory which asserts that the process of observation collapses the quantum wave function and is therefore intimately involved in the time evolution of a system. Our results in Merseyside lend support and a new dimension to the understanding that consciousness and matter are fundamentally related.

Given the apparent failure of conventional methods to reduce crime, it is suggested that it should be a priority for government and social policy makers to investigate the large-scale application of this technology in Britain. This could be achieved by establishing coherence creating groups in other cities.