Manganese Pollution and Violent Crime

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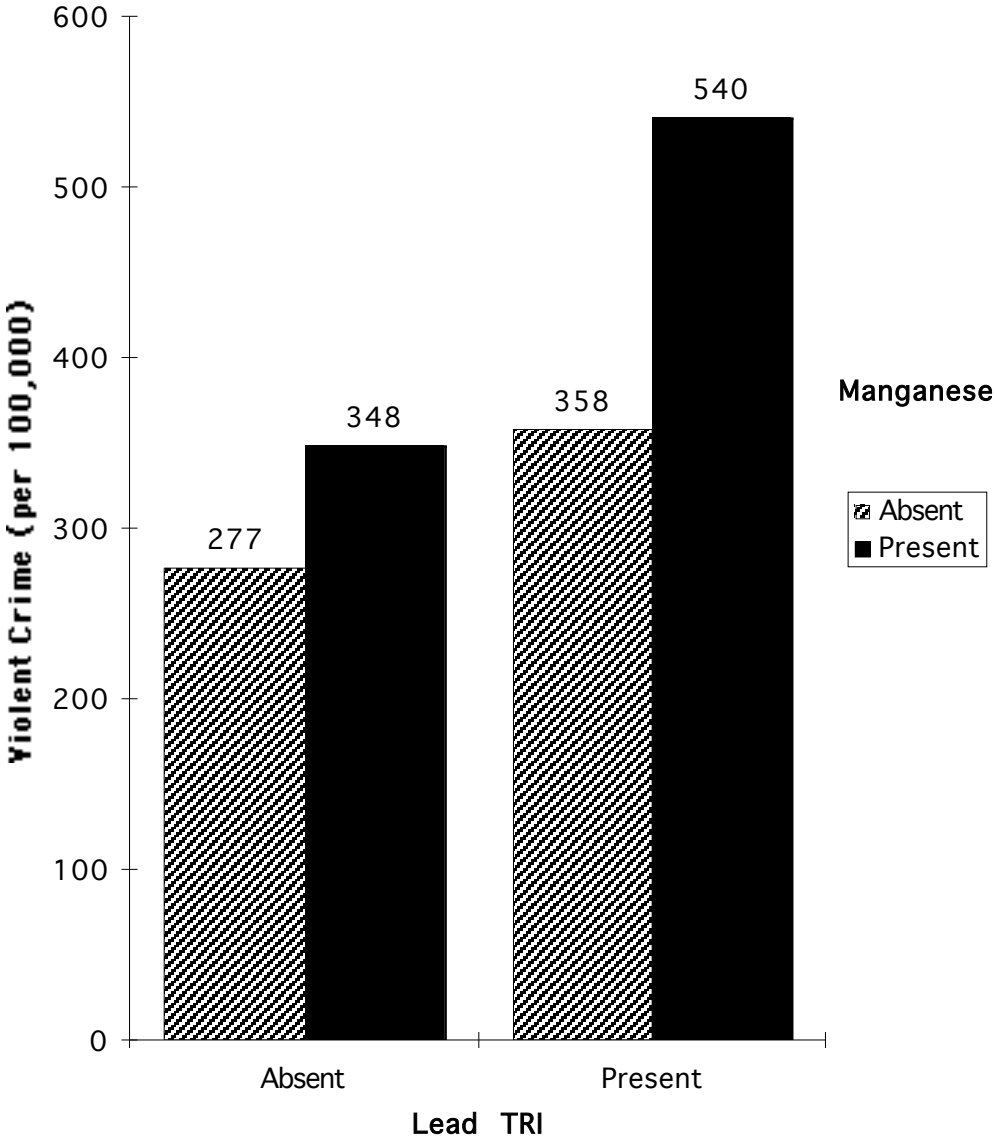
Evidence of my scientific career and qualification to assess harmful effects of pollution with manganese (or other toxins like lead or hydrofluorosilicic acid) is available in *Who's Who in America*. In addition to peer reviewed publications on the harmful effects of toxins. I have given papers at the International Society of Neurotoxicology, the American Academy of Environmental Medicine, & other academic organizations. I've just returned from presenting a paper to the Midwest Political Science Association in Chicago on April 12. This paper included data on my finding that, taking into consideration other factors, pollution with manganese (as recorded in the EPA's "Toxic Release Inventory") is significantly associated with higher rates of violent crime. For all U.S. counties, where there is manganese pollution there are higher rates of violent crime. A mechanism explaining this effect is disturbance of key neurotransmitters like dopamine, which function in planning and self-control. The results matter to taxpayers. It's estimated that a year in jail costs about $25,000 per offender. For every 100 violent crimes that could be prevented by ending manganese pollution, this cost would be about $2.5 million a year. The story is similar for lead or for manganese, but where both pollutants are in the same county, the effects are much worse (like mixing drinks at a cocktail party).

Figure 2: Lead & Manganese Pollution and Rates of Violent Crime per 100,000 in 1991: 2899 US Counties



Violent crime rates in counties without toxic releases of either lead or manganese average 277 per 100,000 population. Where there's manganese pollution but no lead, rates rise to 348 per 100,000. Lead pollution alone is roughly the same (358 per 100,00). Crime rates jump to 540 per 100,000 if EPA recorded pollution with both manganese and lead. Recalculated from Masters, et al., *Environmental Toxicology.*

Table 1: Multiple Regression Analysis of Violent Crime Rates in US – 1991

Variable	Unstandardized Coeff.	T-ratio	probability
Population Density	82.42	20.24	<.0001
Per capita income	-.0007	-2.74	<.0001
Unemployment	NOT SIGNIFICANT		
%BlackPoverty	40.06	2.33	<.05
% HispanicPoverty	62.11	2.79	<.005
PoliceperCapita	153423	l6.56	<.0001
InfantDeath Rate	1.813	2.78	<.005
% housingpre1950	526.75	-13.43	<.0001
Publicwater/cap	225.34	4.07	<.0001
MedianGradeComplete	24.68	3.50	<.005
LeadTRI present	40.80	4.67	<.0001
ManganeseTRI	**58.71**	**6.68**	**<.0001**
AlcoholDeathRate	101.62	11.55	<.0001
#Alcohol&Lead	21.48	2.54	<.05
#Alcohol&Manganese	**55.40**	**6.54**	**<0001**
#Lead&Manganese	**34.89**	**4.11**	**<0001**
#Alcohol&Lead& Manganese	**19.21**	**2.27**	**<.05**

Adjusted r-square: 0.369. F 97.45; DF 17.2783; p - .0000
- interaction terms. Source: Masters, et al., *Environmental Toxicology* , Table III.

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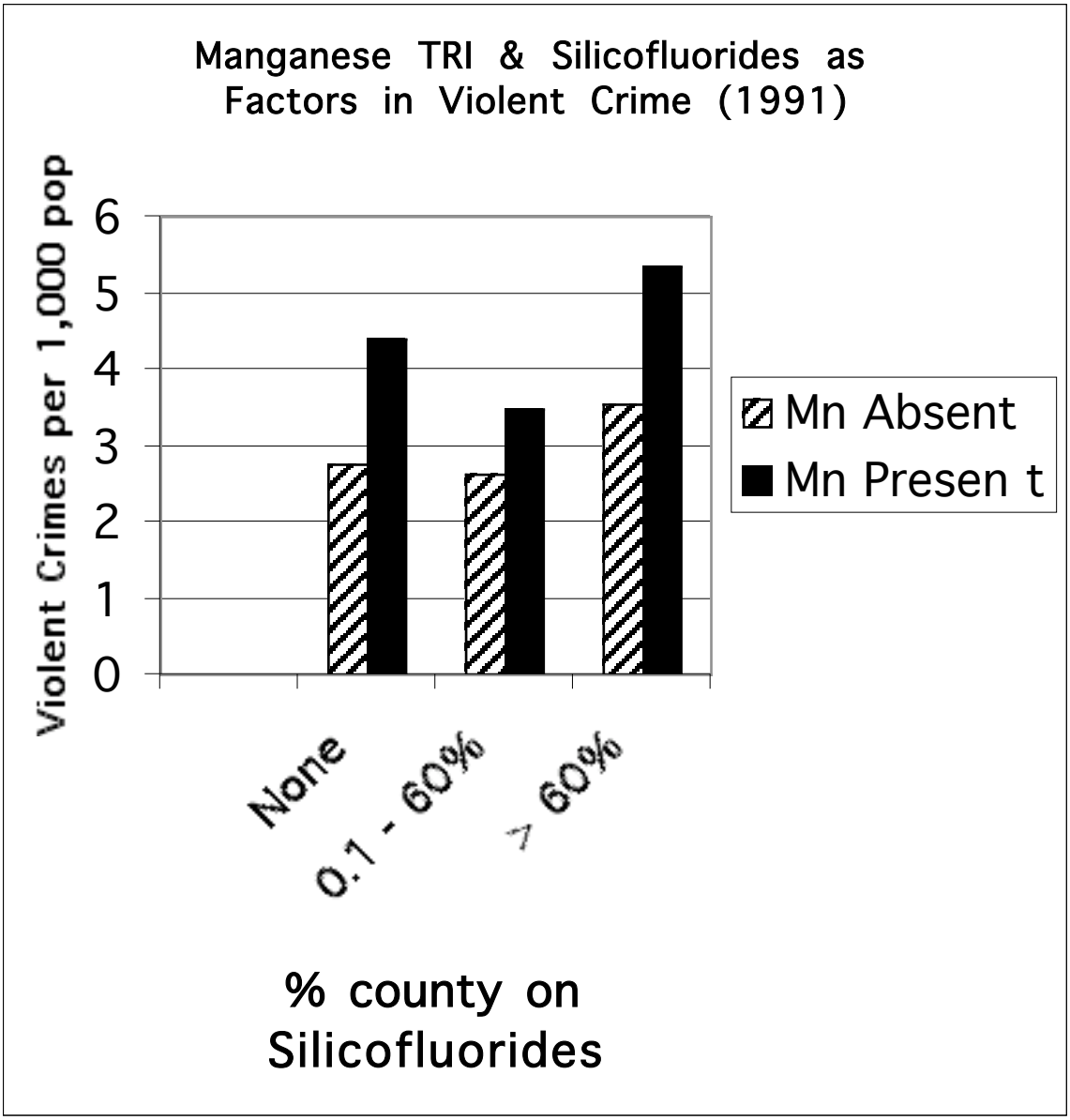
BOLD = Manganese results (which are significant alone AND in combination with other toxins) This table presents a common statistical way of checking the "significance" of factors linked with higher rates of crime. Each factor is listed with numbers measuring relative importance and, on the right, a statistical test of the chance the effect is an accident. Probability "<.0001" (as for manganese pollution) means the influence of manganese would happen by chance only once in 10,000 events. The standard level of "significant" results in science is a probability of "<.05" (an accident only 5 times in 100 events). Considering 13 other factors, including Black poverty and Hispanic poverty, the table shows that the harmful effects of manganese pollution are NOT an accident.



Other research (see publication list) has shown use of "silicofluorides" (SiF) in public water supplies is also associated with increased rates of violent crime. This graph shows that for all US. Counties, whatever the % of population receiving water with SiF, presence of manganese pollution ALWAYS increases the crime rates. Where over 60% of a county's population is exposed to SiF treated water, manganese pollution is linked with an increase of about 1.81 per 1,000 violent crimes (181 per 100,000). Significance: Silicofluoride Usage: p = .0001, F 27.605; Manganese Pollution: p = .0001, F 79.005; Interaction of SiF and Mn: p = .0239, F 3.739. That is, taking SiF into account, the increase in violent crime associated with manganese pollution would be an accident only once in 10,000 measurements. And as in other measurements, manganese significantly increases the harm from of this toxin.

Selected Publications on Neurotoxicity, and Behavior

Masters, R,, Hone, B, and Doshi, A. (1998). "Environmental Pollution, Neurotoxicity, and Criminal Violence," in J. Rose, ed., *Environmental Toxicology: Current Developments* (London: Gordon and Breach, 1998), pp. 13-48.

Masters, Roger D., with Baldwin Way, Brian T. Hone, David J. Grelotti, David Gonzalez, and David Jones (1998) "Neurotoxicity and Violence," *Vermont Law Review*, 22:358-382.

Masters, R. and Coplan, M. (1999a) "Water Treatment with Silicofluorides and Lead Toxicity," *International Journal of Environmental Studies*, 56: 435-49

Masters, R. and Coplan, M. (1999b) "A Dynamic, Multifactorial Model of Alcohol, Drug Abuse, and Crime: Linking Neuroscience and Behavior to Toxicology," *Social Science Information*, 38:591-624.

Wilson, Jim (1999). "The Chemistry of Violence," *Popular Mechanics*, (April), pp. 42-43. (coverage of work by Masters and Coplan).

Masters, R.D., Coplan, M. J., Hone, B.T., and Dykes, J.E. (2000)."Association of Silicofluoride Treated Water with Elevated Blood Lead," *Neurotoxicology* 21: 101-1100.

Roger D. Masters (2001), "Biology and Politics: Linking Nature and Nurture" in Nelson W. Polsby, ed., *Annual Review of Political Science*, vol. 4, pp. 45-369.

Masters, R.D. (2002). "MacLean's Evolutionary Neuroethology: Environmental Pollution, Brain Chemistry, and Violent Crime," Gerald A. Corey Jr. & Russell Gardner Jr., eds. *The Evolutionary Neuroethology of Paul MacLean* (Westport: Praeger), pp. 275-296 (Ch. 15).

Masters, Roger D. (2003). "The Social Implications of Evolutionary Psychology: Linking Brain Biochemistry, Toxins, and Violent Crime," in Richard W. Bloom and Nancy K. Dess, eds., *Evolutionary Psychology and Violence: A Primer for Policymakers and Public Policy Advocates* (Westwood: Praeger), Ch. 2, pp. 23-56.

Coplan, M.J. and Masters, R.D. (1999). "Is Silicofluoride Safe? Comments Re EPA Response to Rep. Calvert's Inquiry" Submission to Representative Kenneth Calvert, Subcommittee on Energy and Science, Committee on Science, U. S. House of Representatives (August 12, 1999).

Web-site: http://www.dartmouth.edu/~rmasters/ahabs.htm