

**SCIENTIFIC RESPONSIBILITY FOR THE
DISSEMINATION AND INTERPRETATION OF GENETIC RESEARCH**

**LESSONS FROM THE
'WARRIOR GENE' CONTROVERSY**

Dr Dana Wensley
* PhD, MA, LLB, RCpN

Dr Mike King
* PhD, BApplSci

Bioethics Centre
Dunedin School of Medicine
University of Otago
Dunedin, New Zealand

Correspondence to

Dr Dana Wensley Ph.D, MA, LLB, RCpN.

Bioethics Centre

Dunedin School of Medicine

P.O. Box 56

University of Otago

Dunedin

New Zealand

Tel (0064) 3 479 5326

Fax (0064) 3 474 7601

e-mail dana.wensley@stonebow.otago.ac.nz

Affiliations

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Abstract

This paper discusses the announcement by a team of researchers that they identified a genetic influence for a range of ‘antisocial’ behaviours in the New Zealand Māori population (dubbed the ‘Warrior Gene’). The behaviours included criminality, violence, gambling, and alcoholism. The reported link between genetics and behaviour met with much controversy. The scientists were described as hiding behind a veneer of supposedly ‘objective’ western science, using it to perpetuate ‘racist and oppressive discourses’.

In this paper we examine what went wrong in the dissemination of the research. We chose as our framework the debate around the ‘internal / external’ responsibilities of scientists. Using this discourse we argue that when the researchers ventured to explain their research in terms of social phenomena, they assumed a duty to ensure that their findings were placed ‘in context’. By ‘in context’, we argue that evidence of any genetic influence on behavioural characteristics should not be reported in isolation, but instead presented alongside other environmental, cultural, and socio-economic influences that may also contribute to the studied behaviour. Rather than imposing a new obligation on scientists, we find this duty to contextualise results is in keeping with the spirit of codes of ethics already in place. Lessons from the ‘Warrior Gene’ controversy may assist researchers elsewhere to identify potential areas of conflict *before* they jeopardise research relationships, or disseminate findings in a manner that fuels misleading and / or potentially discriminatory attitudes in society.

Key Words

Indigenous, Research, Genetic, Ethical, Scientific Responsibility

Word Count

1872 [text] 783 [references] 238[abstract]

1. Introduction: Once Were Warriors - Now Are Criminals: The Flawed Depiction of the ‘Warrior Gene’

The research that sparked the ‘Warrior Gene’ controversy was undertaken in New Zealand by a well respected team of researchers from the *Institute of Environmental Science & Research Limited* (ESR). The primary aim of the research was to analyse the ‘monoamine oxidase gene’ (MAO-A gene) as a genetic marker for alcohol and tobacco response traits.[1] Researchers (presenting at the 11th International Congress on Human Genetics) claimed that Māori research participants demonstrated a unique genetic sequence (polymorphism) which caused significantly higher levels of the enzyme monoamine oxidase.[2] Māori are the *tangata whenua* - the indigenous people of New Zealand. Higher rates of monoamine oxidase had previously been linked to risk-taking and aggressive behaviour,[3] but this was the first time such a sequence (termed the ‘Warrior Gene’ by the researchers) was linked to a racial or ethnically defined group.

While the discovery of this unique genetic sequence on its own does not appear controversial, the entire research was called into disrepute when the results were reported to add weight to genetic theories of causation for a wide range of ‘antisocial’ behaviours in Māori.[4] Rather than distancing themselves from these suggested linkages, some members of the research team expressed views that reinforced genetic theories of causation for criminality, gambling, aggressive and violent behaviour, and alcoholism. One highly publicised report cited a leading member of the team as commenting that the gene could explain how Māori managed to survive their migration across the Pacific, and also explain some ‘issues’ affecting Māori today: "Obviously, [higher rates of the ‘monoamine oxidase gene’] means they are going to

be more aggressive and violent and more likely to get involved in risk-taking behaviour like gambling." [5] Later attempts were made to balance these comments by acknowledging that lifestyle and 'upbringing-related exposures' may also influence these behaviours, and that while there was a genetic influence, 'it's probably a minor one in the scheme of things'. [6] Following the initial pronouncements however, the research was plunged into controversy, with the scientists described as hiding behind a 'vener of supposedly "objective" western science' to perpetuate "racist and oppressive discourses". [7]

While the researchers involved later blamed the media for creating the controversy, [8] that the researchers must also accept responsibility for failing to accurately report and disseminate their findings. We argue that researchers reporting findings in the area of behavioural genetics have a duty to ensure that their findings are placed 'in context', especially when reported to a wider audience. By 'in context', we mean that evidence of genetic influences on behavioural characteristics is not reported in isolation, but presented alongside other environmental, cultural, and socio-economic influences that may also contribute to the studied behaviour.

2. Bad Science or Bad Reporting? A Case for Scientific Responsibility for the Accurate Reporting of Results

While on one hand the 'Warrior Gene' controversy may be seen to have stemmed from a case of 'bad science' (in this case, researchers making claims unsupported by their results), [9] we do not think this fully encompasses the ethical problems raised in this situation. To highlight the more significant ethical issue we choose as our framework the distinction that can be made between the 'external' and 'internal'

responsibilities of scientists. ‘Internal’ responsibilities are thought to encompass considerations surrounding the choice of research topics, funding of research, the design of experiments, and the analysis and presentation of results within the scientific community.[10] In contrast, ‘external’ responsibilities often centre on the *application* of scientific knowledge within society. The debate is frequently illustrated with reference to the controversy surrounding the role of physicists who developed atomic theory, which found application in the atomic bomb.[11] Those who assert that scientific responsibility exists in the ‘internal’ domain alone, assert that while the *use* of the atomic bomb might be unethical, the knowledge that enabled its creation is either ethically neutral, or of intrinsic value *qua* knowledge. In contrast, those who argue that scientific responsibility extends to the ‘external’ domain, assert that the moral responsibility of the physicists cannot be viewed in isolation from the way the atomic bomb was applied in society.

We find most persuasive the argument that beyond the traditional obligation to provide reliable knowledge, science has an obligation to provide ‘socially robust’ knowledge, which can only be achieved through scientists being sensitive to the wide range of social implications of their research.[12] It is noteworthy that the proposed new universal ethical code for scientists (*Rigour, Respect and Responsibility: A Universal Code for Scientists*) appears to favour a broad construction of scientific responsibility. The Code (proposed by Sir David King, Chief Scientific Advisor to the UK Government) states that its aim is to encourage ‘active reflection among scientists on the *wider implications and impacts* of their work’ [emphasis added].[13] The trend, therefore, seems to be towards favouring a broad (rather than narrow) construction of scientific responsibility; one that extends the responsibilities of

scientists beyond simply those considerations which are ‘internal’ to scientific practice.

We advance that it is especially unconvincing for scientists who *actively contribute* to the erosion of the ‘internal / external’ distinction (for example by making claims that genetics explains social phenomena) to deny responsibilities in the ‘external’ domain.[14] By stepping beyond the ‘internal’ domain of science and actively engaging with the ‘external’ domain of society, the scientists engender a duty to present their work in a socially responsible manner. Applying this to the ‘Warrior Gene’ controversy, we argue that when the researchers at ESR ventured to explain the relevance of the higher levels of the enzyme ‘monoamine oxidase’ in terms of its potential impact on social problems, they assumed a duty to ensure that their findings were correctly placed in their appropriate social context. By this, we mean placing the genetic influences clearly alongside the other contributing environmental, cultural, and social factors.

Rather than creating a new obligation on researchers, the responsibility for which we argue is entirely in keeping with the spirit of the Code of Ethics adopted by the *American Society of Human Genetics*. The Code provides that its members must ‘report findings, accurately completely, without distortion and in a timely manner’.[15] Moreover, the fact that the ‘Warrior Gene’ research involved a purported genetic difference between Māori and non-Māori in New Zealand made it crucially important for New Zealand society that the results were reported in a responsible and accurate manner. Accurate reporting in the field of behavioural genetics is especially important in research examining behavioural differences

between groups in society,[16] where an increased genetic knowledge of differences has the potential to affect our views of ‘relatedness, otherness and difference’.[17] For indigenous groups, genetic science has the potential to reinforce preconceived views about biological and social differences, which may result in more barriers and create more avenues for discrimination[18]

If we examine the ‘Warrior Gene’ controversy in light of these responsibilities, we find that the researcher’s assertion that the media was solely to blame for fuelling the controversy is unconvincing. The team at ESR failed in their duty to accurately report their findings. First, if we examine the claims in relation to alcoholism, research suggests a complex ‘gene-environment’ interaction influencing patterns of drinking.[19] Two factors that are thought to have a role in predicting problem alcohol use are the ‘person-environment’ interaction, and the cultural tolerance of heavy drinking.[20] These influences on problem drinking patterns should have been mentioned alongside the potential influence of genetics. Modern environment influences on health and well-being have special resonance for Māori. Before Māori came into contact with the European settlers they were described as ‘healthy, virile and relatively unaffected by serious disease’.[21] The term ‘*Mate Māori*’ has been used to refer to illness thought to stem from purely Māori causes, while diseases introduced by the settlers (or Pākehā) are referred to as ‘*Mate Pākehā*’.[22] Alcohol and tobacco were introduced to Māori by the early settlers. Problems with addiction to these substances clearly falls into the definition of ‘*Mate Pākehā*’, namely those conditions contributed to by environmental influences that pertained after colonization of New Zealand by the early settlers. It would not have been difficult for the researchers to note in their presentation and comments to the media that alongside

genetic influences there were also other relevant contributing environmental factors that may also influence drinking behaviour among New Zealand Māori.

Secondly, if we consider the broader (and most controversial) of comments made by researchers in relation to the ‘antisocial’ behaviours (criminality, gambling, violent and aggressive behaviour), we find that any influence increased levels of monoamine oxidase had on these behaviours should have been better contextualised. Like many indigenous peoples in the world, Māori have a lower socio-economic status than the non-indigenous population. Moreover, the economic gap between non-Māori and Māori has continued to widen in the last decade.[23] Māori are twice as likely than non-Māori to be living below the poverty level.[24] Given that socio-economic factors like these are likely to have a significant influence on the noted behaviours, we argue that the researchers failed in their obligation to clearly place the influence of increased levels of monoamine oxidase (or the so-called ‘Warrior Gene’ polymorphism) in its wider socio-political context. For this reason when the researchers ventured to explain the impact of the monoamine oxidase gene on antisocial behaviours without reference to other contributing social, cultural, or other environmental influences, they failed to provide ‘socially robust’ knowledge.

3. Conclusion

Indigenous groups are now becoming aware of the need to ensure that genetic information intended to improve their health and wellbeing does not disadvantage the community by promoting discrimination and stigmatisation. This has brought some to argue for a new ethical principle which obliges the investigator to ‘respect the values

and interests of the community in research and, wherever possible, to protect the community from harm'.[25] The *World Health Organisation* claims that research on indigenous persons should only be conducted with the consent of internally recognized representatives of the indigenous community.[26] Guidelines have evolved to keep pace with concerns in this area.[27] While these ethical guidelines are helpful in cases where indigenous groups are in a position to form partnerships with researchers (in most cases an 'ideal' scenario), they fail to assist in cases where (as was the case in the 'Warrior Gene' research) the samples derived from the reanalysis of stored tissue samples.

In cases where there is no partnership agreement between research participants and researchers, it is crucially important for researchers to be more responsible in their reporting and dissemination of results. Research into behavioural genetics is severely limited in its explanatory power if it does not take into account environmental influences on phenotypic expression of genetic traits, and the potential interactions between genotype and environment. The 'Warrior Gene' controversy has shown how failing to emphasise the complexity of gene-environment interactions and their influence on behavioural differences between groups can plunge research into disrepute, and fuel harmful discriminatory attitudes in society. Eric Juengst has argued that population genomics has the potential to 'produce scientific wedges to hammer into the social cracks that already divide us'.[28] Placing a clear obligation on researchers to contextualise genetic influences for behavioural characteristics, especially those noted in sub-populations in society (of which indigenous groups are but one) is a crucial step to ensuring that Juengst's prediction is not realised.

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Competing Interests

None

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- 1 Lea, R Chambers G. Monoamine oxidase, addiction, and the “warrior” gene hypothesis. *NZMJ* 2007; **120** (1250): 5-10.
- 2 Hall D, Green M, Chambers G, *et al.* Tracking the evolutionary history of the warrior gene across the south pacific: implications for genetic epidemiology of behavioral disorders. Poster presentation 11th International Congress of Human Genetics, Brisbane, Australia. August 2006.
- 3 A helpful review of the evidence is outlined in Kreek M J, Nielsen D A, Butelman E R, *et al.* Genetic influences on impulsivity, risk taking, stress responsivity and vulnerability to drug abuse and addiction. *Nature Neurosci* 2005; **8**: 1450 – 1457.
- 4 Warrior gene prevalent in Māori study. [Online article] http://tvnz.co.nz/view/page/425826/810285_9 August 2006. Accessed 16 August 2006.
- 5 See reference 4.
6. Maori 'warrior' gene linked to aggression. [Audio clip] 9 August 2006. http://www.nzherald.co.nz/category/story.cfm?c_id=204&objectid=10395334. Accessed 15 August 2006.
7. Hokowhitu B. Genetic disposition ideas racist quasi-science. *The Otago Daily Times* [Opinion] 14 August 2006.
8. Lea, R Chambers G. Monoamine oxidase, addiction, and the “warrior” gene hypothesis. *NZMJ* 2007; **120** (1250): 5-10.
9. We are thankful to our reviewers for pointing out this possible alternative interpretation of events.
- 10 See discussions in Tauber A I. Is biology a political science? *BioScience* 1999;**49**:479-486 and Verhoog H. The responsibilities of scientists. *Minerva* 1981;**19(4)**:582-604

- 11 Schweber S S. *In the shadow of the bomb: Oppenheimer, Bethe, and the Moral Responsibility of the Scientist*. Princeton, New Jersey: Princeton University Press 2000.
12. Gibbons M. Science's new social contract with society. *Nature* 1999; **402**: C81-C84.
13. Council for Science and Technology. *Rigour, Respect and Responsibility: A Universal Code for Scientists*. [2005].
14. For examples of how scientists have eroded the 'internal / external' distinction see discussion in Beckwith J. A historical view of social responsibility in genetics. *Bioscience* 1993;**43**:327-333.
15. American Society of Human Genetics. *Code of Ethics*. [2006]. See discussion Boughman J. ASHG Code of Ethics. *Am. J. Hum. Genet.* 2006; **79**: 1136-1137.
16. See discussion in Sherman S. DeFries J. Gottesman I *et al.* Behavioural Genetics' 97: ASHG Statement. *Am. J. Hum. Genet.* 1997; **60**: 1265-1275.
17. See Morgan D. Legal control. In Marteau T, Richards M, editors. *The troubled helix: social and psychological implications of the new human genetics*. Cambridge, UK: Cambridge University Press 1996:189.
18. Furr L A. Perceptions of genetics as harmful to society: differences among samples of African Americans and European Americans. *Genetic Test* 2002;**6(1)**:25-30.
19. A helpful discussion of the complex interaction examined in Lorenz J. Long J. Linnoila M *et al.* Genetic and Other Contributions to Alcohol Intake in Rhesus Macaques (*Macaca mulatta*). *Alcohol Clin Exp Res* 2006: **30 (3)**; 389-398.

20. Curran G, Raskin H, Hansell S. Predicting problem drinking: a test of an interactive social learning model. *Alcohol Clin Exp Res* 1997; **21 (8)**; 1379-1390.
21. Buck P. *Medicine Amongst the Māoris In Ancient And Modern Times*. M.D. Thesis, University of Otago, New Zealand 1908: 18-19. Cited in Human Genome Research Project. *Choosing genes for future children: regulating preimplantation genetic diagnosis*. Dunedin, New Zealand: Human Genome Research Project 2006:98.
22. See reference 21.
23. Ministry for Social Development and Employment. *The social report 2006: indicators of social wellbeing in New Zealand*. <http://www.socialreport.msd.govt.nz/documents/social-report-2006.pdf>. Accessed 15 September 2006.
24. Waldergrave C, Stephens R, King P. Assessing the progress of poverty reduction. *Social Policy Journal of New Zealand* 2003;**20**:197- 222, 200.
25. Weijer C, Goldsand G, Emanuel E. Protecting communities in research: current guidelines and limits of extrapolation. *Nat Genet* 1999;**23**:275- 280.
26. Sims J, Kuhnlein H V. Indigenous peoples and participatory health research: planning and management / preparing research agreements. Geneva, Switzerland: World Health Organisation 2003. A report prepared by the Centre for Indigenous Peoples' Nutrition and Environment (CINE) and World Health Organization 2003 World Health Organization Geneva, Switzerland.
27. For example the CIOMS *International Ethical Guidelines for Biomedical Research Involving Human Subjects* (appendix one) provides that among those items to be included in a research protocol are the 'circumstances in which it might be considered inappropriate to publish findings, such as when the findings of an epidemiological, sociological or genetics study may present risks to the interests of a

community or population or of a racially or ethnically defined group of people'. [Council for International Organizations of Medical Sciences (CIOMS. *International Ethical Guidelines for Biomedical Research Involving Human Subjects*. Geneva, Switzerland: CIOMS, 2002.] Similar considerations have been advocated by UNESCO, where the *Universal Declaration on Bioethics and Human Rights* endorses the obtaining of community consent where appropriate and the avoidance of stigmatization and discrimination. [UNESCO. *Universal Declaration on Bioethics and Human Rights*. Paris, France: UNESCO, 2005. [Article 6(3)].

28. Juengst E. Groups as gatekeepers to genomic research: conceptually confusing, morally hazardous, and practically useless. *Kennedy Inst Ethics J* 1998;**8(2)**:183- 200,192.