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# Genetic tests for ability?: talent identification and the value of an open future

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This paper explores the prospect of genetic tests for performance in physical activity and sports practices. It investigates the terminology associated with genetics, testing, selection and ability as a means towards a socio-ethical analysis of its value within sport, education and society. Our argument suggests that genetic tests need not even be used (or widely used) as a tool for talent identification to have an impact on the way in which abilities are recognised and celebrated within sport. Just the development of these tests may consolidate discourses associated with performance and techno-scientific views of the bodies which are drawn upon in selecting, labelling and positioning some, rather than others, as 'able'. The attachment of sports institutions to these technologies may be helping to shape a theoretical and wider social construction of how performance is viewed. Our paper problematises the place that such testing may assume in the culture of physical activity and potentially physical education. In doing so, we explore how the development of these tests may impact educational practices related to sport in two keys ways. Firstly, the direct impact in terms of the ways in which the information from these tests may be used to influence the sports experience of young people, within both physical education and sports arenas. Secondly, we consider how, on a broader level, the increasing importance given to genetic science may be (re)constructing wider social understandings of the nature of 'ability' within sport and physical activity. Our response to these developments extends Feinberg's thesis on an 'open future', which argues that selecting the characteristics of children would be unacceptable on account of it diminishing the openness of that child's future—the range of prospects they might encounter that could lead to the flourishing of their life. On this view, we argue that genetic tests for performance might violate the child's right to an open future and that this concern should be taken into account when considering how and whether such tests should be used.

**Keywords:** *Ability; Genetics; Performance; Physical activity; Physical education; Screening; Technology; Testing*

## Introduction

> A specific gene [ACTN-3] linked to athletic performance has been discovered by Australian sports scientists. The gene comes in two variants. People with one

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> variant are predisposed to become sprinters. Those with the second are more likely to excel in endurance events. (Coghlan, 1998)

> **Optimise your genetic potential.**
> For the first time, a fast, simple and painless genetic test can identify whether you may be naturally geared toward sprint/power events, or towards endurance sporting ability. Regardless of whether you are an accomplished athlete, or a beginner, your ACTN3 Sports Performance Test™ result could assist you in optimising your training to make the most of your natural ability within a wide range of sports. (Genetic Technologies Limited, 2004)

The above quotes represent two distinct moments in the development of genetic tests for sports ability. The first is an extract from a piece of scientific journalism discussing some of the earliest findings related to a gene associated with performance. The second quote is from the brochure used to advertise the first commercial test for that very same gene, the ACTN3 Sports Performance Test™. Taken together, a question arises about when the prospect of genetic testing first became meaningful to members of society and, by implication, when a serious critique of these prospects should begin. Certainly, in 1998, no public institution was worried about the use of genetic tests for sporting ability. Indeed, until 2001, no institution would take such science seriously—the identification of performance genes is itself a controversial and contested science. (Also during this year, the Australian Law Reforms Commission (2001) launched a public consultation on the use of genetic information, subsequently published in 2003.) This is because studies that claim to identify performance genes rely on very small sample sizes from which it cannot yet be inferred that they indicate genetic predispositions for specific kinds of performance. Indeed, over the years, estimations of how much genetics influences variation in performance capabilities have varied considerably (MacArthur & North, 2005). Nevertheless, the development of research on genetic tests for performance and the early use of such tests suggests conviction about the credibility of scientific findings.

Questions concerning the identification of ability in sport often fall into debates about the relative contributions of nature and nurture. Today, a new genetic view of human physiology is beginning to disrupt this equilibrium by claiming that we can implement genetic tests for performance. This paper seeks to explore the specific challenges this raises for sport, education and society by situating the instance of genetic testing in a broader bioethical and bio-political sphere, where specific accounts of ability are privileged over others. Our concern echoes those of Nelkin and Lindee (1995) who argue that there is an increasingly pervasive belief about the determinism of genetics, which will inevitably overshadow responsible practice. Thus, one can foresee that the values and assumptions implied by genetic tests for performance will infiltrate pedagogic principles within the curriculum and, potentially, be used as a measure of a child's potential for a range of performance activities. We explore how the development of these tests may impact educational practices related to sport in two keys ways. Firstly, the direct impact in terms of the ways in

which the information from these tests may be used to influence the sports experience of young people, within both physical education and sports arenas. Secondly, we consider how, on a broader level, the increasing importance given to genetic science may be (re)constructing wider social understandings of the nature of 'ability' within sport and physical activity.

Our response to these developments relies on a position developed by the philosopher Joel Feinberg (1980/1992), who explores the legitimacy of selection by considering whether one could justify selecting for characteristics that are often described as disabling. The context of his debate relates to claims from within the deaf community to select positively for deafness. In our case, we explore selecting for 'enabling' or 'enhancing' characteristics and suggest that some parallels can be drawn. Feinberg argues that it would be morally unacceptable to positively select for disabling characteristics, just because the rationale for such a choice fails to optimise the openness of the prospective child's future. Importantly, a moral distinction must be made between (a) selecting an embryo that exhibits the disabled characteristic and (b) altering an embryo to bring about the disabling characteristic. The former of these is vulnerable to the 'non-identity problem' (Brock, 1995), which argues that neither the selected or discarded embryos could claim to have been harmed since, for the former, their life would not have been possible in any other condition and, for the latter, they will never reach a stage that warrants moral or legal recognition of the harm they encounter. For the altered embryo, actively disabling characteristics of an embryo could be seen as having limited the openness of that potential life's future.

This line of inquiry encounters rather complicated dilemmas of discerning when something like 'ability' even begins in life. We will not attempt to resolve this matter, though consider that—in contrast—positively selecting for specific kinds of abilities limits the openness of the child's future in a way that overstates the parameters of parent authority. Moreover, using genetic tests to select which children receive investment and what sports they should place is also unjustified. We go further to suggest that this is unreasonable because such decisions misunderstand the term ability. Nevertheless, we also recognise that parents make these kinds of decisions every single day and that such decisions might fall outside of the normal areas of regulatory structures.

Our paper pursues the scepticism of many scientists over the presumed meanings of genetic information, as a way into a critique on the developing commitments to genetic testing within the world of sport. We investigate the terminology associated with genetics, testing, selection and ability as a means towards a socio-ethical analysis of its value within sport, education and society. Our argument suggests that these tests need not even be used (or widely used) as a tool for talent identification to have an impact on the way in which abilities are recognised and celebrated within sport. Just the development of these tests may consolidate discourses associated with performance and techno-scientific views of the bodies which are drawn upon in selecting, labelling and positioning some, rather than others, as 'able'. The attachment of sports institutions to these technologies forms part of a wider social

context within which those working in sport gain a sense of the importance of genetics in sport performance and ability. This may be helping to shape a theoretical and wider social construction of how we view performance.

Thus, our task is to problematise the place that such testing may assume in the culture of physical activity and potentially physical education. In doing so, we focus on how particular abilities are privileged and marginalised already in established policy texts and health practice within schools, physical education and wider physical activity/sport cultures. We claim that this research makes assumptions about how performance is theorised within sport development and its relationship to environmental influence. Our interest is in the ways that genetic testing, as a feature of competitive sport, may come to shape the social construction of ability and the ways in which particular knowledge's of the body (Evans & Davies, 2004) may be transmitted and 'received' within the pedagogical practices of physical (activity) cultures. While one might envisage that such tests would be used only with adult athletes, there is good reason to suppose that the genetic testing of children would form an integral part of talent identification. Indeed, the brochure for the first commercial genetic test for performance includes images of children competing in races, thus verifying the intent to use this with minors (see Genetic Technologies Limited, 2004).

## The genetic debate in sport

It is necessary to begin by acknowledging how the debates surrounding genetics in sport have gained political relevance and how a central aspect of this involves the prospect of genetic doping. In June 2001, the International Olympic Committee (IOC) Medical Commission met to discuss the implications of gene therapy for sport (International Olympic Committee, 2001). It was shortly followed by the World Anti-Doping Agency (WADA), which met in 2002 to discuss genetic enhancement at the Cold Spring Harbour Laboratories in New York (World Anti-Doping Agency, 2002). Also in 2002, the United States President's Council on Bioethics met twice to discuss the ethics of genetic technology related to sport (United States President's Council on Bioethics, 2002a, 2002b). In 2003, WADA (2003) included a prohibition of 'gene doping' within the 2004 World Anti-Doping Code. As well, the American Association for the Advancement of Science (AAAS) met in 2003 and 2004 to discuss the science and ethics of gene transfer technology for sport (AAAS, 2003; Kane, 2004). Most recently, research into insulin-like growth factor 1 (IGF-1) strengthens the claim that gene doping might be possible very soon, which has caused considerable controversy (Lee *et al*., 2004) Also, in December 2005, WADA drafted its *Stockholm Declaration* on gene doping where the IOC President Dr Jacques Rogge played an active part in its composition. Critically, this declaration was the first moment where a warning was given about the use of genetic tests in sports. In all previous policy documents from WADA it had not been present. It states:

> 7. The use of genetic information to select for or discriminate against athletes should be strongly discouraged. This principle does not apply to legitimate medical screening or research. (World Anti-Doping Agency, 2005)

Over the last few years, various commentaries have arisen about this technology, arguing that sport must now re-evaluate the value of performance in the context of gene doping (Munthe, 2000; Tamburrini, 2002; Miah, 2004). Yet, one aspect of this revolution that remains overlooked considerably is the use of genetic information for sport. This is surprising since the use of genetic information is of immediate importance to the world of sport and to the use of genetic technology in general. In contrast, genetic modification has received mixed reception, from scientists who claim it to be complete nonsense, to those who take seriously the possibility. Indeed, when a number of Austrian skiers showed raised levels of haemoglobin at the Torino 2006 Olympic Winter Games without any clear explanation, speculation turned to the new substance 'repoxygen'. This substance is alleged to stimulate the delivery of the erythropoietin gene and thus was seen as the first instance of genetic doping, though none of the Austrian athletes tested positive for any illicit substance.

The use (and testing) of genetic information within sport gives rise to some concerns that are broadly allied with matters of social justice and fundamental freedoms (Miah, 2000). In the broader discourse of bioethics, it has become apparent that a conventional rights foundation does not suitably protect the new kinds of human that can emerge as a result of genetic modification and already the United Nations Educational, Scientific and Cultural Organisation (1997) has drafted a special declaration on the Human Genome and Human Rights, which warns about the potential for discriminatory practices associated with genetic information. Where such knowledge is applied to sport, a number of related concerns arise. Over the last five years, various reports and research findings indicate that genetic testing could be utilised for two key purposes within sport, each of which have given rise to considerable concern about how such tests might lead to unreasonable discrimination (Australian Law Reforms Commission, 2003). The first involves screening for genetic predispositions to risky conditions, such as head trauma for boxing. Indeed, in this case specifically the Professional Boxing and Combat Sports Board of Victoria (Australia) decided not proceed with 'its proposal to deny boxing licence on the basis of [an athlete's] genetic information' (ALRC, 2003, 38.34), perhaps fearing litigation from athletes who felt unreasonably prejudiced by the ruling. In these cases, the dispute is not whether athletes should be protected from unreasonable self-harm, but whether the use of genetic information to characterise harm is overly paternalistic, given its contested status as a determinant of embodied characteristics.

The second use of genetic information related to genetic tests for performance, our core concern for this paper. The ACTN3 genetic test is one such case (Savulescu & Foddy, 2005). The test emerges from collaborative research between various universities and the Australian Institute for Sport. Its producer, Genetic

Technologies (Australia) claims that it can 'identify whether you may be naturally geared towards sprint/power events or towards endurance sporting ability'. (Genetic Technologies Limited, 2004). Moreover, publicity for the test states that 'Regardless of whether you are an accomplished athlete, or a beginner, your ACTN3 Sports Performance Test™ result could assist you in optimising your training to make the most of your natural ability within a wide range of sports'. Within the brochure for the test (titled 'Your Genetic Sports Advantage ™' (Genetic Technologies Limited, 2004)), this text is accompanied by an image of young children (male and female, approximately age 10), crossing the finishing tape in a race. Later on in the brochure, Genetic Technologies provides more advanced details on the scientific basis of the test, including reassurances that the test is completely painless and that should not be a sole measure for aptitude. Finally, they include the bibliographic details of two scientific references (Yang *et al*., 2003; MacArthur & North, 2004).

## Genetic tests versus talent development?

Genetic tests such as this could become an integral measure of talent development/identification within competitive sports and a legal, ethical concern for their use has only recently been highlighted (Australian Law Reforms Commission, 2003; Weisbrot, 2003; Rankinen *et al*., 2004). One can identify increasing sympathy for a genetic view of non-disease traits and, arguably, increasing willingness to accept their use for lifestyle claims. In particular, the UK recently approved the use of sex selection for 'family balancing' and one might argue that this decision marks a major shift in policy whereby the use of genetic tests for non-medical reasons is now defensible, albeit under very specific conditions. The acceptance of this freedom, however, raises questions about the kinds of conditions within which people might be able to claim an entitlement to have revealed the genetic information of themselves or their prospective children, as a means to informing their lifestyle decisions.

In contrast to this concession by the UK government, the absolute freedom to select for sex has been criticised by those who suggest that it could lead to prejudicial views of different genders, particularly in countries where the social pressure of bearing a male child is high. Thus, this decision raises questions about whether other non-medical or 'lifestyle' choices about procreation might emerge. The prospect of selecting for performance genes emerges as a strong contender for near future applications. Crucially, this potential does not currently stretch to prenatal selection and we limit our analysis to the kind of genetic testing that is currently available. Such tests would involve little more than taking a mouth swab from a child and so have the advantage of avoiding any complicating concerns about the invasiveness of treatment. One of the crucial differences in prenatal and postnatal genetic tests is that the latter involves a description of genetic characteristics, while the former would reveal potentialities. In both cases, the genetic information must be interpreted in the context of environmental influences,

but stronger claims can be made about performance capabilities when testing, say, a 12-year-old when compared with an embryo. This is because a considerable amount of 'nurture' will have already affected the individual. Indeed, this is the rationale behind genetic testing for disease, so as to allow the individual to modify their behaviour with a more informed view on how their life might proceed. While the application of these tests to young people rather than embryos simplifies the social, ethical and legal issues considerably, there remain controversial and contested claims that are implied by this application.

Externally, the close association of the Australian Institute of Sport with the development of the ACTN3 genetic test might seem troublesome given WADA's declaration. However, the AIS is also the only sports institution to have spent considerable resources problematising the ethical and legal implications of such tests. Moreover, in all of their advisory documentation, they emphasise that such tests should never form the sole basis of selection. To this extent, the AIS exhibit indications of careful and good practice. Moreover, the research underpinning their hunt for performance genes has received approval by various ethical committees. However, one can again refer to Nelkin and Lindee's (1995) concern over genetic determinism as a basis for questioning the development of such tests at all. Arguably, once the capacity to test is out there, it will be very difficult to prevent the determinist connotations that seem to pervade the lay perception of genetics. At the very least, sports organisations must respond to this potentiality with rigorous measures to impede the parental interest to assume determinist conclusions about genetics and performance.

Of course, some coaches and scientists will defend the use of genetic tests for performance as a helpful tool to enhance the accuracy of talent identification processes. To this extent, knowledge of potentialities can be utilised as a form of competitive edge in training programmes and the pursuit to win medals and break records. However, it is not necessarily a mechanism for enhancing an athlete's chance of success, except where it is a scarce form of knowledge, or where its use can be seen as strategic. Crucially, like other training techniques, an athlete's advantage arising from genetic tests will depend on whether other athletes are also using them. At most, the consequence of widespread use might be greater competition in elite sport, as there will be fewer athletes whose genetic capacity is not perfectly aligned with the needs of their chosen sport. Indeed, athletes will be steered towards those sports where they are likely to excel. While this is already standard practice of elite talent identification, genetic testing may narrow our understandings of the multifaceted ways in which ability emerges within sporting contexts. Moreover, one might ask legitimately about what happens to those young people, whose genetic capacity is not perfectly aligned with the needs of their chosen sport. From the perspective of a competitive sports club, it will be advantageous to steer the child towards a sport where they are more likely to succeed. Indeed, such advice could be seen by sports coaches as nothing more harmful than advising a child who is not likely to be very tall that they will not be an elite high jumper. Of course, when discussing the extreme cases such as these,

one might find less to challenge, even if one considers that less ideal body types can still succeed in sport. The difficulty is that, if such tests are used, many children who might only marginally not fit the ideal genetic type and whose capacities might still be elite, will be excluded from elite sports. Moreover, this process of selection omits the relevance of environmental factors as determinants of success in sport, not least to mention the individual's enthusiasm and enjoyment of specific kinds of activities over others. One might fear that this instrumental approach to talent identification—as if success in sport can be correlated with enjoyment—unreason-unreasonably dehumanises the experience.

Genetic information about a young persons 'ability' may be used to discriminate at a number of levels. Firstly, it may prevent those who *want* to specialise in a sport, from doing so. Such testing may, for example, prevent athletes who are currently performing well, from receiving scholarship programmes for Universities, or 'training/talent identification' grants, if their genetic profile is 'lacking'. Genetic information in this sense raises a number of questions about the types of 'able' bodies that organisations may celebrate, or invest in. Perhaps most obviously, we may increasingly see young athletes channelled into particular sports or specialist training, in ways that may narrow their physical activity experience. All of this raises questions around the children's rights and agency within these decision making processes, a subject that remains limited in its development (Tymowski, 2001, 2002). It would be almost impossible to imagine a context within which such tests are developed and yet, where parents or coaches do not use this information to then invest in working with particular athletes, or encouraging their child to enter into particular sports over others.

Here, Feinberg's notion of a right to an open future appears violated by the determinist manner in which genetic information is applied to direct a child's participation in sport or, indeed, their rights as 'learners'. Thus, the use of genetic testing to determine which children or young people might benefit from specialised sport training may result, for example, in parents, teachers and coaches making decisions about what they believe a child 'ought' to specialise in, rather than what the child would like to experience. Our concern here is that genetic information may become yet another tool for stratification within sport, physical activity and physical education. This might occur at an institutional level through selection for talent identification programmes and scholarship schemes. More broadly, it might take place at more of an interpersonal level, in terms of the ways in which coaches and teachers may invest more time and effort with some young people and not others, on the basis of their 'genetic potential'. In this sense, we cannot easily remove the idea of genetic screening, from its wider social implications for how we invest in and upon particular bodies in relation to our understanding of ability

Extending this to the context of Physical Education, it is not difficult to see how such forms of 'talent identification' might be closely aligned with current educational climates, and therefore utilised divisively. In the UK, for example, discourses of 'ability' are already informing selections to separate the 'able' from the 'less able' as a

way to 'identify the winners and losers at the earliest possible stages, allowing continual checks to ensure that those predicted success 'fulfil' their potential' (Gillborn & Youdell, 2001, p. 97, cited in Evans & Davies, 2004). One might wonder whether, as Evans and Davies (2004) ask 'ability' and 'talent' will become further reduced as a commodity to be 'spotted' in the gifted few. What abilities might be missed that may later develop in young people? There are serious issues here of premature distinctions and stratifications taking place.

Moreover, the notion of using talent identification tools to help young people 'fulfil potential' opens up a number of complex debates, in terms of the possibilities they may have for engaging with a range of physical movement cultures, rather than specialising in sport training. What of the unique individual development that a child may experience through diversity of movement forms that cannot be measured in terms of performance or output? The visceral and pleasurable aspects of engaging in physical activity, which a child may wish to pursue, but not necessarily 'excel' in seem overlooked where genetic testing is utilised. We question therefore, whether such genetic testing might act as a technology, which will not only gather information about the body, but also constitute it, by framing and directing young peoples experiences and opportunities within physical activity. These tests might provide increasing pressure on those select 'able' to focus on particular sports, and train at a particular level to achieve this 'potential' Such technological features may be helping to shape a theoretical and wider social construction of how we view performance. When taken up within pedagogical environments and different pedagogical modes, this could inhibit a child's opportunity to display particular physicalities or participate in particular activities. Will there still be the opportunity to explore sport and physical activity in what Pronger (2002) refers to as alternative spaces that represent the body's potential for transcendence, e.g. 'the feeling of *true freedom* one has while swimming, running or cycling, or in other pursuits that allow us to throw our bodies through space and time with some amount of skill'. Will such tests move the opportunities for these young people towards increasing modes of performance, and away from emphasising creativity, diversity, exploration and the joy of movement?

The use of genetic science is also encoded with particular expressions of what ability and performance may entail. In this sense, genetic science not only creates tools for genetic testing, but may be implicitly constructing 'realities' around how we understand ability; what are the cultural implications for this in sport and physical activity at a wider level? Genetic testing in sport has mostly been discussed in the context of its implications for high level sports performance. However, there are wider implications for the ways in which understandings of ability are constructed generally within sports cultures and, indeed, its potential application to broader populations. Our point here is that not only are there implications for the opportunities elite athletes encounter or not, but that genetic testing might more implicitly (re)construct or (re)affirm wider cultural understandings around ability which impact upon physical activity contexts in a broader sense. Relying on genetic testing as an indication of a child's future would be a fast track towards the

dominance of technologically determinist visions of the body. Such genetic developments, albeit residing as a feature of competitive sport, may also have strong implications for Physical Education when we consider that in many countries Physical Education (PE) continues to be influenced by sport discourse. These processes also relate to issues of social justice, inequality and opportunity when we consider that 'the discursive space of the good student in PE' is already seen to be shaped by characteristics of 'competence' 'skill' and 'fitness' (Hunter, 2004, p. 181). In addition to this, education is rife with 'performance' culture with a heavy focus on attainment targets, and forms of assessment (see Ball, 2004). Within such cultures, genetic testing may be the making of yet another premature distinction on the basis of a particular construction of ability (and the values associated with such definitions and terminology). Physical Education in many countries is already focused on assessing young people in relation to their abilities against criteria at different levels. Since 2000 in England and Wales, Physical Education has been shaped by the National Curriculum, a document which sets out the legal requirements of entitlement for all pupils aged 5–16, across all subjects within state schools. Evans and Penney (2004) argue that such documentation (and the policies driving it) rest upon the notion of social and ability hierarchies, where children's performances are measured in various activities against pre-given criteria as they move through different 'key stages' (or levels). Within the UK, and indeed in other policy contexts such as Australia and New Zealand (see Burrows & Wright, 2004), Physical Education is thus already firmly entrenched within cultures which seek to differentiate and make distinctions about young people at very early stages. If genetic testing is to feature more heavily within the cultures of sport, this may significantly consolidate such cultures of performativity.

All of this raises questions about privileged definitions of ability within the context of PE and sport that seem counter to sound pedagogic principles. For example, one might wonder what happens to young peoples' opportunities for demonstrating ability? How might genetic knowledge of the body be implicated in the construction of ability and therefore the achievement of particular hierarchies within sports contexts? It also raises questions about the impact of genetic determinism on the opportunity for young people in sport to be 'able' and to receive recognition and pleasure within physical cultures. Even if such testing procedures are not a feature of physical education per se, their feature within competitive sport may impact on teachers and coaches readings of the body, performance and ability. In other words, it may contribute towards the production of 'knowledge of the body' (Evans & Davies, 2004) and may come to be further transmitted through physical activity selection and practice. Those in the sports field working with young people are influenced not only by their own biographies and beliefs, but by the requirements of particular sports agencies, and the cultures and contexts within which they are socialised. Evidence is already emerging that new orthodoxies are being established in schools relating to the body and health (see Evans & Davies, 2004; Rich *et al*., 2004). The role of genetic science also becomes increasingly significant when we consider that many of these orthodoxies are:

> nurtured, rationalised and derive their authority from knowledge/s largely produced by the disciplines of the biological, behavioural and health sciences (see Pronger, 2002), and which now constitute largely taken for granted 'regimes of truth' (for example, about 'health' and 'ability') among teachers and others in society, ITE and schools. (Evans & Davies, 2004, p. 4)

It is the potential for these sciences to create 'regimes of truth' around the body which we feel feature in the debates around genetic testing. The reliance on this information and its inevitable determinism, may lead to regimes of truth around ideologies which suggest that genetic information reveals something inherent and stable about the *persons identity*, as well as their physical ability. Such genetic determinism may present dangers of reverting back to biomedical notions of ability which fail to recognise that physiology is only part of the process; that physical ability is variously re-configured within and across different situations of learning (for further reading on situated learning see Lave & Wenger (1991) and Wenger (1998)). Research is already suggesting that teachers may have particularly narrow conceptions of child development in relation to Physical Education and Health contexts (see Burrows & Wright, 2001; Beckett, 2004) and genetic determinism may compound these. This is not to deny the potential value of genetic testing. Critically, however, the knowledge arising from genetic tests for performance reference potentiality or capability that must be seen in relation to environmental factors.

For example, one might consider the effects that this sort of genetic testing might have for the ways in which ability and ethnicity is made sense of by those working within sport and physical activity. Those currently researching within genetic science and sport, have for example, reiterated the need for a greater understanding of ethnicity and genetics. The research surrounding the ACTN3 genetic test indicates that the so-called 'speed gene' varies in prevalence between ethnic populations. These findings raise further questions about genetic determinism discourses that have been discussed by a range of authors in the context of sport in recent years (Hoberman, 1992, 1997; Entine, 2000; St Louis, 2003). However, the functional benefit of the different alleles remains unclear though scientists are quick to point out that genetic variation is not synonymous with racial variation (Pitsiladis & Scott, 2005). Claims about the genetic basis of performance need to be carefully contextualised against the social and environmental factors which impact and often impede certain ethnic minorities experiences and opportunities within sport. Here, there are strong possibilities for the recontexualisation (Berstein, 1990) of science into persuasive forms of discourses around 'truths' of the 'knowledge of the body' (Evans & Davies, 2004) which may serve to accentuate particular forms of inequalities and unjust forms of differentiation. The focus on ability as if given at birth and differentially fixed 'across' ethnicity, could for example, accentuate biological frameworks which have long impacted upon black athletes' sporting experiences, where they continue to be 'channelled' into particular activities based

on beliefs that they are biologically more suited to them. As Leonard (1998, p. 230) maintains

> the fact that performance differentials exist does not mean that blacks are inherently superior but rather that the role models available for blacks, and closed occupational doors in other areas have prompted them to channel themselves into sports.

Again, this is not to refute the idea that there may be physiological subtleties, but that it is the way in which this science is used and re-contexualised which concerns us. It can strongly influence, and legitimise selections and interactions which occur within and through sports contexts, many of which have negative consequences.

## Conclusion

Our conclusions have particular relevance given the recent statement developed by WADA in its Stockholm Declaration (2005). Moreover, the recent inquiry into 'Human Enhancement Technologies in Sport' launched by the British Government Science and Technology Select Committee (2006) raises questions about how enhancing technologies are characterised. In the context of genetic testing, enhanced athletes could emerge simply by selecting positively for more efficient genetic capacities. Yet, there is no regulatory framework for such use despite the recent discouragement from WADA. We argue that genetic testing for performance can transform the way that ability is understood, measured and evaluated within the curriculum. We would draw a cautionary note that when read uncritically, the notions of ability underpinning such genetic testing can lead to forms of determinism which may become yet another way in which we monitor, regulate and measure children. Such forms of monitoring, regulating and surveying the body can be problematic for many young people, as is the case with practices around weight loss, physical activity and health in schools, currently associated with an 'obesity epidemic' (see Evans *et al*., 2004; Rich *et al*., 2004; Gard & Wright, 2005; Rich, 2005). This has led to the emergence of new orthodoxies within the school curriculum, relating to the body (size, shape), health and self (Evans *et al*., 2004), which can ironically do a great deal of damage to the embodied identities and health of the young people it targets.

Indeed, our case embodies the challenge alluded to by Delanty (2002) whose radical constructivist view on the new genetics warns of the vulnerability of social critiques on genetics to the power of technological determinism His urging for less dualism on society and nature helps to situate our debate in the context of contested definitions of ability and the practices within which these definitions are played out. The ways in which genetic testing might come to feature as a normalised and legitimate tool for differentiation may compromise what can be asserted as a young person's right to an open future (Feinberg, 1980) in relation to physical activity opportunities and their rights as learners. As such, we suggest that, at most, genetic tests should be used as a way of shaping advice about training rather than influencing

the kind of sport a child decides to undertake. However, our proposal requires the athlete and coach to put aside the primacy of results as a core determinant of investment into talent.

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