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Article abstract

The main objection to genetic enhancement is that it will create a "genetic apartheid," deepening existing inequalities. This paper offers considerations that can weaken the inequality argument against genetic enhancement. First, I question the dichotomy of treatment versus enhancement since the differences between the two are unclear. Second, I argue that human enhancement is part of human nature and that there is no sound reason to accept it in other domains while rejecting it in genetics. The paper also demonstrates that inequality is present in every dimension of society, that "God-given" genetics is profoundly unequal, and that genetic enhancement can operate as a mechanism by which a new genetic equality can be achieved. However, the paper underlines that genetic equality is not, per se, a value to which we ought to aspire if it leads us to a uniform community of downsized human beings. Genetic equality is only valuable if it enhances humankind in general.

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TÉMOIGNAGE / PERSPECTIVE

The Better I Can Be: In Defence of Human Enhancement for a New Genetic Equality

Vera Lúcia Carapeto Raposo[a,b]

Résumé
La principale objection à l'amélioration génétique est qu'elle créera un "apartheid génétique", aggravant les inégalités existantes. Cet article met en lumière des considérations qui peuvent affaiblir l'argument de l'inégalité contre l'amélioration génétique. Tout d'abord, je remets en question la dichotomie entre traitement et amélioration, car les différences entre les deux ne sont pas claires. Deuxièmement, je démontre que l'amélioration humaine fait partie de la nature humaine et qu'il n'y a aucune raison valable de l'accepter dans d'autres domaines tout en la rejetant en génétique. L'article démontre également que l'inégalité est présente dans toutes les dimensions de la société, que la génétique "divine" est profondément inégale et que l'amélioration génétique peut fonctionner comme un mécanisme permettant d'atteindre une nouvelle égalité génétique. Toutefois, l'article souligne que l'égalité génétique n'est pas, en soi, une valeur à laquelle aspirer si elle nous conduit à une communauté uniforme d'êtres humains réduits. L'égalité génétique n'a de valeur que si elle améliore l'humanité en général.

Mots-clés
amélioration de l'homme, droit, génétique, discrimination

Abstract
The main objection to genetic enhancement is that it will create a "genetic apartheid," deepening existing inequalities. This paper offers considerations that can weaken the inequality argument against genetic enhancement. First, I question the dichotomy of treatment versus enhancement since the differences between the two are unclear. Second, I argue that human enhancement is part of human nature and that there is no sound reason to accept it in other domains while rejecting it in genetics. The paper also demonstrates that inequality is present in every dimension of society, that "God-given" genetics is profoundly unequal, and that genetic enhancement can operate as a mechanism by which a new genetic equality can be achieved. However, the paper underlines that genetic equality is not, per se, a value to which we ought to aspire if it leads us to a uniform community of downsized human beings. Genetic equality is only valuable if it enhances humankind in general.

Keywords
human enhancement, law, genetics, discrimination

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INTRODUCTION

This paper will tackle one of the most commonly invoked arguments against genetic enhancement: the purported violation of the principle of equality (there are other arguments against gene editing (1) but they will not be discussed in the paper). First, I analyse the concept of genetic enhancement to distinguish it from related realities. Genetic enhancement should not be confused with other forms (medical and non-medical) of enhancement, as they have different modus operandi. Likewise, genetic enhancement must be distinguished from therapeutic genetic interventions due to their different aims. In the latter case the dividing line is blurred, and this paper will highlight the problematic nature of the distinction. As this paper is focused on the principle of equality, I use this principle to differentiate treatment from enhancement and unpack the notions of equality of results and equality of opportunities.

After having established an operative concept of 'genetic enhancement,' the paper will address the possible ways in which it can foster violations of the principle of equality; it will distinguish discrimination in access to opportunities from discrimination in outcomes. Problems arise even before the use of genetic enhancing technologies, because not everyone can have equal access. Even if questions of access and funding are settled, the problem persists because of the potentially discriminatory outcomes of these genetic interventions. Such outcomes relate to the classification of human features as absolute goods or as positional goods, leading to a discussion of these concepts and their application to the domain of genetic intervention.

Once the arguments against gene editing are articulated, their limitations are explained by highlighting some basic facts about genetics and equality. These are counterarguments aimed to show that the relation between these two concepts is not as contradictory as is usually represented. Moreover, I will argue that genetic enhancement can serve as a mechanism to promote genetic equality, when properly used. My intention is not to glorify the concept of genetic equality – on the contrary, I highlight some of the limitations of this concept and point the way to further discussion.

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GENETIC ENHANCEMENT

Genetic enhancement and other forms of enhancement

Almost every human feature can be improved, and almost everyone wants to be improved, genetically or otherwise, as this is intrinsic to human nature. This basic statement has many implications. First, it is important to understand what counts as enhancement. The obvious response is something that will make us better – although enhancement can also make us worse in some respects (2) – but beyond this conclusion, the rest is blurred. For instance, suppose there is a genetic trait that allows a person to operate normally with only a few hours of sleep (3). Is this an advantage? It might only be relevant to people who need to be alert for many hours. Furthermore, the qualifications of 'good' and 'bad' features are neither timeless (in the past, society did not consider women's intelligence important, while today it does) nor universal (in some cultures, a higher percentage of body fat may be considered beautiful, while in others thinner is considered better). Thus, what we consider enhancement could be viewed negatively in different parts of the world or in a different time (4).

The idea of enhancement has negative connotations due to its connection with eugenics (5-6). The understanding of what eugenics is has varied throughout history, but in modern times it is intimately connected to discrimination and hierarchization of human life, i.e., racism, sexism, and ableism (7). Eugenics and consequently enhancement – although they may or may not be different concepts (8-9) – is justly treated with suspicion (10). Nonetheless, enhancement is a natural fact of life. We arguably try to enhance ourselves all the time, though not through genetics: we take pills to improve our concentration, undergo liposuction to lose weight, we read and go to the gym. Biomedical and non-biomedical enhancement are two types of medical enhancement,[1] and the latter is highly valued in society; indeed, those who do not enhance themselves may be classified as lazy. None of these enhancements are forbidden, as this would be considered unfair state intrusion into private life. In contrast, genetic enhancement is usually banned, and no constitutional constraints have been argued against this prohibition (11-14). This practice is regularly criticized, and its supporters are sometimes accused of "playing God" (15-17).

Genetic enhancement is the process by which an organism's DNA is added to, deleted from, or otherwise changed (18) using gene editing, which is a precise form of genetic engineering (19). The real differences between genetic and non-genetic enhancement remain to be determined. One seems to be the supposed irreversibility of genetic enhancement (20), while non-genetic enhancement can be reversed. However, some forms of the latter cannot be undone. For instance, if someone learns a new language, they cannot simply forget it, and this is also the case for any new expertise acquired (11,21). Another commonly argued difference relates to risk: non-genetic enhancement is considered safe, while genetic enhancement is considered risky (16,22). However, the difference in this regard lies in the level of development of the involved practices, and it is important to consider that genetic enhancement is a recent development in the scientific world. If the scientific community invests in research in this field, gene editing (the safest and more efficient type of genetic intervention) may well become as safe as other procedures (medical and non-medical) that are now frequently used for self-improvement. Furthermore, commonly accepted non-genetic enhancements can present risks; for instance, Roberts (13) points out that the use of mobile phones is sometimes linked to infertility risks.

Therapeutic and non-therapeutic genetic interventions

Within genetic interventions a distinction is commonly made between therapeutic and non-therapeutic genetic interventions based on their different ethical and legal assessments. Article 13 of the *Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine* (CHRBm) (23), titled 'Interventions on the Human Genome,' states that "An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants." The Explanatory Report of the Convention states in paragraph 89:

> The progress of science, in particular in knowledge of the human genome and its application, has raised very positive perspectives, but also questions and even great fears. Whilst developments in this field may lead to great benefit for humanity, misuse of these developments may endanger not only the individual, but the species itself. The ultimate fear is of intentional modification of the human genome so as to produce individuals or entire groups endowed with particular characteristics and required qualities. In Article 13, the Convention provides the answer to these fears in several ways.

According to the CHRBm (a view consistent with the common understanding), the acceptance of these types of interventions largely depends on their connection with health. When an intervention only aims to improve performance in certain activities – sports (24), intellectual tasks – it becomes far more controversial. It has been argued that genetic therapies aimed at combatting medical conditions that put someone in a more difficult position in relation to everyone else should be authorized, while genetic interventions unrelated to health and that seek to improve the species by making people better, faster, and stronger should be forbidden. Thus, it is crucial to distinguish between treatment and improvement. But as I will argue, this distinction is extremely unclear (25), and apart from a few clear examples the vast majority of situations fall within a grey area.

[1] 'Biomedical enhancement' is a term that will be used to refer to forms of enhancement that use medicine but not genetic technologies; in contrast, 'non-biomedical enhancement' will be used to refer to forms of enhancement unrelated to medical and scientific procedures.

ENHANCEMENT VERSUS TREATMENT

Possible distinction criteria

It is not clear when the modification of certain features can be considered enhancement (26-28). If we reduce or abolish an existing feature, is this enhancement? What if we prevent violent behaviours? The difficulty in defining enhancement is closely connected with the difficulty in defining the concept of 'disease' and differentiating it from a 'particularity,' but these distinctions are crucial for our discussion.

Norman Daniels defines disease as a deviation from the natural functional organization of a typical member of the species; thus, every intervention that goes behind what is typical of the species is enhancement (29). According to Daniels and Sabin, the distinctive criterion is the existence of a disability (that requires a treatment) or, conversely, the improvement of the normal functioning (30) of the human species. In the words of Daniels (31, p.309), "[t]he treatment-enhancement distinction draws a line between services or interventions meant to prevent or cure (or otherwise ameliorate) conditions that we view as diseases or disabilities and interventions that improve a condition that we view as a normal function or feature of members of our species." That is, based on the criterion of purpose, we can say that a treatment is designed to cure health problems generated by illnesses and incapacities, whereas improvement is conducted on individuals considered 'normal' (whatever that may be). In short, everything depends on whether the situation is pathological (32-34). This criterion has obvious merits, but it presents some blurred lines regarding the difficulty (or even impossibility) of establishing the concepts of health and disease (35), as well as in defining what is meant by the "normal functioning of the human species."

Consider an example of two children, both of extremely short stature, one because of a hormone deficiency and the other due to genes (i.e., the parents are also very short). Although their actual situations are similar and both may face difficulties in daily life due to their height, only the first would be a candidate for genetic therapy because of the recognized illness based on hormonal malfunctions (32,36); i.e., only the one suffering from a hormone deficiency requires a treatment to reset the "normal functioning of the human species." As for the other, any intervention will be considered enhancement and probably rejected. Even disregarding gene editing, this dilemma stands in relation to the use of hormonal treatments for children that are shorter than average, either because they have a hormonal dysfunction (this would be a treatment) or because they are shorter due to their genetic heritage (this would be an enhancement).

Another example is provided by Buchanan (11): a person who has a normal capacity to deal with radiation lives in a location with severe radiation, and it is therefore necessary to make this person more resistant to radiation and better able to maintain their human functions. In such a case, would restoring the basic human functions be categorised as an improvement or a treatment?

Genetic interventions, health and disease

Just because a genetic intervention is related to health and disease does not necessarily mean that it is therapeutic (37). Examples of genetic interventions that are not therapeutic, but are still health related, include increasing tolerance to particular foods or environments, slowing cognitive decline or muscle wasting associated with aging, increasing longevity, or altering mental attributes. Furthermore, it has been debated whether a therapeutic intervention requires an existing pathology or if it can have a preventive nature. Acceptance of a restrictive criterion implies that only modifications targeting an actual medical condition that a person has at that moment are therapeutic (e.g., if the person suffers from cystic fibrosis and the gene editing aims to cure it). According to this perspective, excluded from the category of therapeutic actions are those interventions that are not curative at the present – even though they may aim to benefit future health. This is the case with gene editing to provide resistance to communicable diseases (38). As a health-related enhancement (39) it would have decisive effects on public health, because increasing our immunity would decrease the number of people infected in the future, thus decreasing health care expenditures (40).

It is worth noting that these interventions in the genetic framework are the equivalent of vaccination. It is debatable whether vaccines ought to be characterised as improvements (13,31,41) or as treatments (32). If we consider genetic interventions that increase human resistance to disease as forms of enhancement, then vaccines are also enhancements because their aim is to make our bodies immune to certain diseases that we do not have right now (note that these are state-imposed enhancements). Conversely, if we understand vaccines as treatments, we have to conclude that these kinds of genetic interventions are also therapeutic as there is no difference between strengthening the resistance of the human body through vaccines or through genetic interventions. Strictly speaking, these types of interventions are better classified as prevention. This understanding leads to the emergence of new concepts: *treatment*, *enhancement*, *prevention* and, eventually, *remediation*, a concept invoked by Walters and Palmer (39) to characterize interventions in cognitive ability designed to increase below average capacities to average ones. These are not mere theoretical labels, as everything classified as enhancement risks not being legally accepted, while the other categories may be. Vaccinations are health-related enhancements, commonly accepted in daily medical practice. The fact that this same goal – improvement of our immune system – might be achieved using genetic interventions should not change its legal and ethical appraisal (42).

The principle of equality as a distinction criterion

In a way, all interventions performed on our bodies are improvements, although of different types: some relate to health (either curative or preventive), while others do not (39). However, this conceptualisation does not solve our difficulty, as we continue to face the problem of separating health-related improvements from other types of improvements.

A possible distinction criterion is the principle of equality. It might be a fair criterion, but it is not an easy one to operationalise due to the many different theories about its content (43). I will focus on the dichotomy between equality of opportunities and equality of results (43), analysing how these two different understandings can operate in our discussion. If we adopt the equality of results as a distinction criterion, an intervention that aims to equalise the features of all individuals, this 'all' requires further specification: Does it pertain to a defined group of people, the entire community, or all of humankind (disregarding their different departure points)? The criterion referencing equality of opportunity is more interesting (44). From this perspective, a treatment is related to the fulfilment of personal needs and aims to guarantee the same development opportunities to all through the restoration, or improvement, of deficient features of the individual, allowing them to reach the level of the average human being. This does not mean, however, that all individuals will reach the same level, because not all individuals are born with equal capacities and talents. Thus, the treatment does not aim to make X equal to Y (equality of results), but to allow X to develop the capabilities they would have had if not for the disease or anomaly.

In any case, an intervention whose purpose exceeds the threshold of the average human being would be considered an improvement. Imagine two scenarios of gene editing: in one, we repair a particular gene (or group of genes) so that it allows an exceedingly short person to attain a stature considered normal; in the other case, gene editing aims to allow the person to become taller than the average individual. The difference seems clear (45): in the first case, we are eliminating a peculiarity that places that individual in a situation of inferiority – assuming that being shorter than the average is a disadvantage, as it seems to be in societies that prize tall people (46) – while in the second case we are raising the individual above the average standard. Accordingly, enhancement would only apply to improvements that make us better than everyone else, but not to those that enable us to reach the same level as the average person. This apparently obvious distinction demands an extremely difficult (and ultimately impossible) definition: that of 'an average person' in genetic terms.

What if an 80-year-old man asks to have his physical vitality restored, as it was when he was 20 years old? His request still fits within the parameters of normal human function, but not a function typical of a person his age. Would this be an enhancement or a treatment? Considering the definition of 'treatment' provided by Sandel – "restoring and preserving the natural human functions that constitute health" (14, p.47) – this would be a treatment. However, it is not clear if natural human functions in this context concern those natural to a person of that age or to any natural body function, without regard to age and the individual's particular conditions. An effective treatment can, I suggest, only describe the restoration of human functions natural to a person of that age, as a 70-year-old man with the agility of a 20-year-old would be an enhanced human being. Note that this example is not impossible: we can find older people who are as fit, fast, and agile as young people, and this happens exactly because they enhance themselves (although not via genetic interventions) by means of continuous physical training and diet, without which this would be impossible.

The insurmountable difficulties of this distinction

Although the distinction between treatment and enhancement seems to be simple, it is anything but, requiring the clarification of several operative concepts. The very notions of 'treatment', 'disease,' and 'health' are far from clear (13), especially in light of the extremely broad definition of health provided by the World Health Organization (47), as "a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity." The progressive expansion of the scope of medicine, which was traditionally only used for treatments, but now also covers preventive medicine, palliative care, sports medicine, contraceptive procedures, and fertility procedures, has also contributed to the blurring of these categories. The concept of treatment is constantly expanding, as medicine is highly elastic and quickly categorises certain conditions as diseases, a movement that is reinforced by the concept of disease as a social construction (48). However, we must avoid the trap of categorising some characteristics as diseases and thus as factors for discrimination, as has happened throughout history. Today it would be unthinkable to consider sex or race as a disease, but some persist in considering non-binary sexual orientation or identity (e.g., homosexuality, transgender) as abnormal or even a disease; so, does this mean we can or should eliminate such differences with a medical or genetic treatment?

In conclusion, the distinction between treatment and enhancement seems, in theory, to be a reasonable criterion to distinguish the kinds of genetic procedures that should be allowed from those that should not. However, it is ultimately not a workable criterion for the simple reasons that there is a great deal of grey area in which is impossible to say whether a certain intervention is a treatment or an enhancement, and it is probably true that some would qualify as both (9,49,50). In the end – and in spite of different opinions (50) – we may be discussing a useless distinction (35), since the criterion may not lie in the exact qualification of the intervention in question, but on the expected benefits (35). The question is not so much if an intervention is a treatment or an enhancement (sometimes the separation between these concepts is very blurred), but the benefits it can afford to both the individual and the overall community, as well as the hazards (legal, ethical, medical) it may carry. For instance, many consider vaccination an enhancement, but still a very beneficial one, both individually and collectively, and so it must be promoted. In contrast, a treatment (i.e., a medical intervention that can cure an existing pathology) that is extremely expensive and with very low chances of success might not be desirable, at least, not when paid for by a national health service or public insurance plan. According to Harris and Chan "[t]he real question that regulatory agencies need to ask is not whether

a procedure is best defined as therapy or enhancement, but whether the benefit it will produce is worth the risks incurred and whether or not it is safe, or morally permissible, to deny the individual the liberty to make this decision for themselves." (52, p.339) However, as is recognized by the authors themselves, the key question is who ought to make this assessment.

GENETIC DISCRIMINATION

Can genetic enhancement promote genetic discrimination?

One of the main criticisms of human genetic enhancement is that it will increase inequalities (53). MacKellar (54) argues that this practice conflicts with the intrinsic value of every human being, as recognised in Article 1 of the Universal Declaration of Human Rights. Mehlman and Botkin (55) even equate it to slavery since it undermines equality. There are other arguments against it, some of which are common to every kind of genetic intervention. For instance, attention is often paid to the potential harm due to expected and unexpected consequences derived from genetic manipulation (56). In particular, with regard to germinal interventions, it has been pointed out that they modify the genetic code of the next generation, limiting the free choice of people to come. If the genetic intervention is not decided by the person themself, there is also the problem of a lack of informed consent.[2] There has always been a gap between the haves and have-nots. A danger with current genetic technologies is that they will deepen these inequalities in two different ways. The first of these pertains to concerns about access to genetic technologies, the second arises with respect to the consequences of their use (57,58).

Access to genetic technologies and genetic services to be provided by the state

With regard to access to genetic improvements, problems arise because of their high cost which makes them accessible only to the wealthiest people (59). Genetic enhancement will thus be exclusive to a small elite, whose members will have the chance to be healthier and ultimately 'better' human beings (60). The financially well off would become the genetically rich (61). The risk of a kind of 'genetic apartheid' that differentiates the gene rich – which Lindsay (62) calls 'genetic aristocracy' – from the 'gene poor' (63) becomes a real concern. This problem can, I suggest, be solved with proper funding. By guaranteeing everyone access to genetic enhancement this could actually be a way to eradicate pre-existing discriminations, instead of inflating them (42). However, even if a service is qualified as therapeutic, there is no guarantee that it will be offered within the general package of subsidized health care services by a national health service or covered by private health insurance. Not all health care services are covered due to constraints on the health care budget. Take the case of cosmetic surgery as an example: a mammary reconstruction after a breast excision following cancer treatment is usually covered but other kinds of cosmetic surgeries are not, even if they are related to health concerns (e.g., the person may suffer from emotional distress because of the size of their nose). At the same time, a national health service usually covers abortion on demand, even though unwanted pregnancies are not a disease or even an abnormality.

According to Norman Daniels, the choices regarding which kinds of services are covered by national health services are intended to "[keep] people functioning as close to normal as possible" (31, p.315). However, if this were the case, then to be coherent, every situation in which a person lives in pain and distress and for that reason requires, for instance, a cosmetic intervention, should also be covered by public money because it is necessary for the person to operate normally. This does not happen with cosmetic surgeries or other elective interventions, even if they are considered therapeutic. This would probably not be the case with genetic enhancement either, at least until the prices of genetic interventions start to go down (and in fact the tendency is for prices to decrease as technology develops). Thus, as Daniels puts it (31), the distinction between treatment and enhancement does not coincide with the distinction made in practice by health care systems, between obligatory and non-obligatory health services.

The outcome of genetic enhancing interventions: positional goods and absolute goods

Two main concerns arise in moving the discussion to the consequences arising from the use of genetic improving technologies. One relates to their effects on those that were not enhanced. Discrimination can be aggravated by reducing the number of people who are different (meaning people whose features are devalued by society), thereby threating genetic diversity (64,65). Those who remain not genetically modified could feel even more ostracised and neglected by public policies (5,66-70). The other concern relates to those that were enhanced. Enhanced human beings – who some may call 'transhumans' – may be 'better' than current humans. This might even lead to our extinction, just as the rise of *homo sapiens* led to the extinction of the Neanderthals (71).

The discriminatory effect of genetic enhancement seems to operate based on the distinction between absolute and positional goods (25,72), or, as some formulate it, between all-purpose goods and positional goods (73). Absolute goods are those that are beneficial to their holders even if everyone has access to them. Health is usually viewed as an absolute good: the fact that other people are also healthy does not diminish the value of each person's health.

Positional goods, in contrast, only carry benefits to the person possessing them if other people do not. Being an especially gifted musician brings someone into the spotlight because most people are not equally gifted, and such a rare talent is highly valued. The value of such goods depends on their distribution in society, such that the more they are available, the less they

[2] However, because these are arguments against any genetic modification, even against those traditionally not considered enhancements, the paper will not deal with them specifically.

are worth. As Bognar puts it, "[p]ositional goods are inherently scarce." (72, p.17) Following Bognar's example, take the case of tall people: being tall is highly valued in some societies, in both romantic relationships and professional life, simply because there are fewer tall people in the world in comparison to the rest of a population. If everyone suddenly became taller, being tall would no longer be an advantage.[3] Thus, to keep their advantage, those who are tall have a strong interest in preventing others from becoming so. Applying this reasoning to genetic enhancement, it can be argued that those with access to gene editing would seek to prevent others from using it; otherwise, their enhancement would not bring any actual advantage.

However, this distinction and subsequent reasoning can be rebutted. First, there are goods in society that can be considered positional goods because those who have them are highly valued in society. It can be assumed that their value depends on their rarity. However, people do not prevent each other from having access to them. Consider physical strength and beauty. These features would probably be praised even more if they were rarer, as the more widespread they are, the less special they become. Yet, there is no social movement from the fit and beautiful to prevent others from becoming so. In fact, the opposite is true: there is a panoply of expert advice and inexpensive ways aimed at helping others to become fit (diets, low-cost gyms) and beautiful (makeup, cosmetic surgery). These solutions are even promoted by those who already have these 'gifts.' Another example is education: following the reasoning that sustains this distinction, education would be a positional good because knowledge is particularly valuable when only a few have it. In a world of highly educated citizens, extensive knowledge would not confer the advantages (better jobs, higher social status) that it does now. So, it appears to be a positional good. However, many societies try to make education available to everyone instead of limiting it to a small elite. And it may even be the case that the highly educated are the ones promoting education and pushing government to provide, or even impose, a certain level of education for every child. This is exactly what happens with absolute goods. Educational policy is grounded in the acknowledgment that in a society with more educated people everyone will benefit, as this quality leads to general prosperity.[4]

The second point is that the fate of most positional goods is to become absolute goods. When some individuals acquire a positional good, what generally happens is that other individuals feel pressured to do the same. In other words, in a world where being a genius is highly valued, intelligence will be a good that everyone desires. If a group of people manages to become more intelligent, everyone else will try to obtain the same result, otherwise they will not be able to compete professionally, academically, socially, or even romantically. However, the more intelligent everyone becomes, the less valuable intelligence becomes because it ceases to be special.

Thirdly, it is a fact that positional goods are reserved for a small group of people and apparently only bring benefits to those who are privileged. This seems like a waste of resources, as the benefit they get might fall short of the investment made to get them. However, as Anomaly (42) points out, the assessment cannot be limited to the positional good in itself – it must also attend to the path taken to achieve that good. It is a competitive procedure, that focuses on the competitors' new capacities, such as resilience and ingenuity.[5] Those positive externalities go far beyond the final positional good, and so the process ends up being positive for many others. It should be noted, however, that this beneficial result is not valid for positional goods achieved through gene editing, as in these cases there is no real effort nor proper competition (the 'effort argument' will be dismantled in the next section).

Finally, the greater good of society as a whole requires the "democratization of goods," that is, the transformation of many positional goods into absolute goods. A society with "better people"[6] brings more benefits to the entire community. Buchanan mentions a "network effect." (73, p.10) This is especially true for intelligence: brighter people will make life easier for everyone by creating better organizations and discovering new things, such as cures for diseases. Thus, intelligence should not be a positional good, restricted to an elite, as it would be more beneficial for the community to enhance the intelligence of everyone. Harris and Chan argue that "Enhancements are a benefit because they are good for the enhanced individual independently of any competitive advantage they also confer. Put another way, at an individual level, a good is still a good whether it brings you level with others, sets you ahead or leaves you still behind but better off than you were" (52, p.338). This is not valid, though, for every positional good. For instance, assuming that longevity is a positional good, the fact that every member of society (or many of its members) achieves a longer life span will bring more burdens and benefits, as the social costs of their maintenance would increase (for instance, increased health expenditures funded by a national health service would become a burden for taxpayers), eventually diverting resources from other purposes. Even with respect to what is regarded as intelligence, there might be some negative effects associated with its generalization to more people, as studies show that highly intelligent people may be more prone to depression and mental disorders (42).

Genetic enhancement can involve absolute goods and positional goods, and how it is categorised depends on the specific feature being enhanced. The way that individuals get access to goods (e.g., self-paid, state funded) conditions the collective perspective about those goods. If genetic interventions are paid for by their users – and assuming that the high price will make them available only to the wealthy – then the positional goods involved in genetic enhancement (intelligence, for instance) will

[3] What is unknown is what evaluation would be made of short people should being tall become the rule. Would they be rejected for being different from everyone else or would they be more appreciated because of their rarity; that is, would being short become the new tall?
[4] Similar reasoning might apply in the context of Anomaly's observations (42) regarding intelligence, and this might be understood as the genetic equivalent to education in terms of human enhancement.
[5] I recognize that this is not applicable to the same extent with respect to all sorts of enhancement.
[6] I will assume this would be a society with healthier and more educated people, but also with beautiful and fit people that feel good about themselves and thus are happier.

become even more positional. The more restricted they are to a small circle of people, the more valuable they become, whereas if everyone had access to these goods their value would decrease. However, suppose that either the price of genetic enhancement would be low enough to make it generally available to everyone or else the state would subsidize citizens to facilitate access. In any of these scenarios it would be difficult to restrict access to genetic enhancement and society would probably realize the benefits of an 'upgraded' community. Although enhanced people might not collect many benefits in individual terms (they would not be so special), society in general could benefit extensively and eventually genetic enhancement would become an absolute good.

FACTS ABOUT GENETIC ENHANCEMENT AND EQUALITY

The reasoning sustaining the idea that genetic enhancing interventions promote genetic inequalities and subsequent discrimination appears to be based on convincing arguments. However, those arguments are challenged by basic facts of our existence that substantiate even more compelling counter-arguments.

Gaps exist in every dimension of life

Differences between members of society will always be present in every community. The families in which we are born and the socioeconomic classes to which we belong largely determine our destinies and the opportunities we will have during life. Families with greater economic resources can afford to offer their children better education and better medical care and can provide them with better lives (36). Suppose parents could also offer their progeny better genes via genetic engineering. Would this be any different from already available social advantages, or does genetic engineering represent an whole new way of playing the game? It could be argued that genetic modifications are far more decisive for our success than other forms of improvement (75), but this statement is grounded in a faith in genetics that fails to understand that genes are not ends in themselves, but are tools employed to achieve other ends. It is inevitable, I argue, that – at least at the beginning – this innovative resource will only be available to economically privileged people, and this will exacerbate the division between rich and poor (76). Money, education, and physical appearance have long been factors in discrimination; genetic patrimony (and the possibility of modifying it) could become a new form of discrimination. The creation of a genetic bazaar that is only accessible to the wealthy is a danger to consider.

However, some other factors must also be noted. First, it is well known that those with more financial power have access to better health care and thus can improve their quality of life and increase their longevity (72). Even in health care, the distribution of resources largely depends on what people can pay; thus, some have access to medicines and medical treatments that are denied to others. However, this is not a reason to prevent payers from using those resources. For instance, some drugs are so prohibitively expensive that only a few can afford them, even if a national health service covers part of the cost. Nonetheless, it is not generally argued that for reasons of equality those who can afford them should be forbidden from buying them, even if those who cannot pay will suffer and/or die from the disease.[7] The same can be said for medical interventions that are accessible only to those who can pay for them: although not everyone can be treated using these advanced medical resources, their use is still allowed by those who can pay for them. Thus, the fear of "wealth-based access to genetic enhancement" (77, p.79) is not more compelling than worries about other types of wealth-based distributions of goods. John Robertson (78), an author who has long advocated for the right of parents to use genetic enhancement technologies, argued that disparities in access to this technology should not prevent those who could afford it from using it. "One can decry the disparities that exist and urge that society correct distributive inequities, however, without denying all persons the right to make these choices. In the end, the need for social justice is not a compelling reason for limiting the procreative choice of those who can pay" (78, p.227).

Aside from economic constraints, certain health resources such as donated organs are only available to some. Due to scarcity, not every patient in need can receive a lifesaving organ. Yet, it would not be reasonable to claim that everyone should be denied organs for the sake of equality. As Bognar puts it (the author later tries to rebut this argument, but with little success) "[s]ince a ban on genetic enhancement does not benefit anyone. There is no good reason to introduce it" (72, p.23). In sum, the reasoning "we all have it, or no one has it" seems to be applied only to genetic engineering.

Instead, I suggest the ultimate goal should be to make these technologies available to everyone. The fewer legal bans, the sooner they can be used for the less economically fortunate, as legal prohibition tends to increase the prices of services and products. Even if genetic interventions are initially available only to a financial elite, in time they will be extended to larger groups as the technology becomes cheaper (72). This is what has happened with almost every health care improvement. It is reasonable, then, to expect that genetic enhancement will also become available to everyone; and just as many countries now provide health care services at no cost (or at a symbolic cost) to their citizens, in the future genetic enhancements may be subsidised by national health services.

Genetics is profoundly unequal

A common argument against genetic enhancement relates to the idea of an ultimate natural equilibrium. One may say that until now, naturally born genetic differences have made individuals better in some respects and more fragile in others,

[7] Note that some do actually make arguments of this kind. The objection is that private payors drain resources and expertise (in the form of healthcare professionals) away from publicly funded systems.

maintaining a certain equilibrium among human beings. Now, however, there is a huge risk that in the future we will all fight for the best possible genetic code and will not accept anything less, thereby breaking that equilibrium. However, I do not think this is a realistic view. Genetic attributes are not equally distributed among all human beings (79), and as such, gene editing could be used to grant to all human beings the same genetic opportunities.

Differences between members of the human community will never be totally eradicated. Biologically, nature creates some of us as more beautiful, more intelligent, faster, or stronger beings; and these characteristics are always relative to others, and their value socially determined. But just as we cannot hold a volcano liable for natural disasters, we cannot blame genetics for the differences that particularize each of us. 'Bad genes' are the sole result of bad luck, and for that reason the people affected should not expect any kind of redress from nature (80,81). Neither can we blame the individual. According to the luck egalitarianism view (82-84), individuals cannot be held accountable for so-called 'brute luck,' i.e., things that do not depend on their choice, such as genetic traits, that are only due to nature. Conversely, people can be held responsible for 'choice luck,' i.e., things that depend on their choices (25). However, if a person is deprived of the chance to correct their bad luck (brute luck) the result is that the individual must bear, without any external help (genetic enhancement will be an example of such external help) all of the challenges and difficulties derived from their genes. Certainly, we can help a person by means other than genetic enhancement, such as via education, social security, drugs, and medical interventions. However, I argue that none of these is as effective as genetic enhancement, assuming this procedure reaches a satisfactory level of efficiency and safety. So, in a way, it is as if we actually hold the person liable for bad luck by denying them access to effective genetic improvement.

Genes come from brute luck and not from individual choice; that is, they are provided by a force over which we have no control. However, we do not have to accept this as fair, or as the natural and immutable order of things, simply because they are imposed by nature. With such an attitude, we would all die from diseases, and with no drugs or medical treatment, letting nature take its course. Why do we accept the distribution of good and bad characteristics supplied by nature but not the redistribution made by human beings? How do natural and scientific approaches differ? Whenever the distinction between 'natural' and 'artificial' is made, the former is always considered good and the latter evil, a reasoning that lacks any justification. As Kamm notes, "The assumption behind [this view] is that nature is sacred and should be honored. But why should we believe this? Cancer cells, AIDS, tornadoes, and poisons are all parts of nature. Are they sacred and to be honored?" (85, p.8).

Many features of modern life are unnatural. If we are concerned about maintaining the natural order, let us refuse antibiotics and medical treatment, destroy our cars, planes and laptops, and return to living in caves. This argument against genetic enhancement assumes that everything transformed by human ingenuity is bad or 'unnatural', especially when it interferes with the process of life creation, as it violates the natural order of things. Medicine, above all things, interferes with the process of birth and death. New drugs and complex medical procedures, along with social and public health interventions (e.g., sanitation, access to clean drinking water) have extended the human life span beyond what would have been imaginable decades ago and prevent death in scenarios where in last century a person would be doomed. If the 'natural/unnatural' criterion were to be followed, medicine (and public health) would have to be abolished (85). It is curious, then, that we tend to consider it unfair when nature imposes serious illnesses on some of us while sparing others, and so we try to provide these people with medical care, sometimes at no cost, to try to make them just as well off as any other person. Conversely, when 'bad features' are not related to obvious health issues (let us not forget the difficulty in defining 'health' and 'disease'), we simply ask people to accept their bad luck, i.e., their brute luck.

There are two main errors in this line of reasoning. The first is that genetic luck must be simply accepted and not corrected. The second is that this view does not describe reality, as we usually do in fact allow interventions for 'bad luck' whenever there are health issues involved. It is as if matters related to love and acceptance in the community are less relevant than matters related with health (25). Dov Fox writes, "no one believes that ugly people, for example, should be compensated with publicly subsidized plastic surgery or sexual relations just because they face challenges in the pursuit of romance, through no fault of their own. An important measure of luck, I submit, is what gives meaning and value to many of the goods things in human life." (86, p.601) In other words, and as noted by the 2003 US President's Council on Bioethics, "although less radical than the quest for 'perfection,' the quests for happiness, success, and self-esteem, especially in our society, may prove to be more powerful motives for an interest in using biotechnical power for purposes that lie 'beyond therapy'" (79, p.31).

The distribution of genes by nature is unequal. Some of us are much prettier, others are much more intelligent, and others are taller than others; some of us fit all three of these descriptions, while others have none of these features. No matter how much effort we expend, we will always face limits imposed by our genes. According to the President's Council on Bioethics, "[N]ature sets limits on what can be accomplished by education and training alone. No matter how much we try to help, the tone-deaf will need more training to learn to carry a tune, the short will be less likely to excel at basketball, the irascible will have trouble restraining their tempers, and the insufficiently smart will remain handicapped for competitive college admissions" (79, p.43). Competition in the real world has never been truly fair. All human beings share some basic characteristics, but there are huge variations, and we are all different from one another in terms of our physical structures, intelligence, emotions and other physical and mental abilities. Some are simply better at sports or science just because they are more genetically gifted. Even though they may work hard to achieve success in their respective activities, they have an inherent advantage. Anyone without their 'genetic gifts,' working as hard or even harder, might never reach those same achievements. Thus, the demand for 'effort' to ensure legitimate fair play is misleading because our points of departure are always unequal and thus unfair.

To forbid genetic enhancement would only reinforce natural inequality, or as Cohen (25, p.660) puts it, “one might even say that denying me an enhancement leads me to be the victim of two injustices, the first genetic, the second regulatory, both of which prevent me from pursuing a desired life plan.”

Non-genetic enhancement is commonly accepted

Enhancement can operate through various means apart from genetics. As already mentioned, all forms of learning, training, and sport activity are commonly accepted ways to improve ourselves. But there is an important difference: in such activities, a person must spend effort to improve (to study something new, to practice until mastering music or a sport, to train until a fit body is achieved), while in gene editing there is no effort at all. Gene editing may thus feel like cheating because the individual can become as good as others, or even better, without blood, sweat, and tears (25).

Ultimately, condemnation of genetic improvement seems to be rooted not so much in the idea of making one human being better than others but in the means by which that goal is achieved (73). Few will oppose study, exercise, or any other activity that requires effort to improve, but when we do it by a path that does not require personal effort, then social condemnation occurs, as if we were cheating in a competition or, in religious terms, taking the place of God. Besides the lack of effort, the greatest sin seems to be the intervention of genetic manipulation. Consider all commonly accepted forms of non-genetic enhancement, many of which work with no personal effort. We have pills to reinforce memory; students using these pills can obtain better results on exams with less study time, although this can also be considered a form of cheating, as with performance enhancing drugs in sports. Another example is liposuction, or any kind of cosmetic surgery: liposuction can create a thinner body without months spent in the gym and dieting, while a nose job can provide a more attractive nose than a person’s genes provided. These practices are not uniformly forbidden.

One can say that in non-genetic enhancement there is still some kind of effort, since when someone undergoes cosmetic surgery, they experience effort and pain because of the procedure. However, if this is the key obstacle to accepting genetic enhancement, let us create an enhancement in which the ‘receptor’ has to feel a certain amount of pain to make it ethically acceptable. Alternatively, let us suppose that genetic enhancement is so expensive that most people have to work a great deal, months or even years, to be able to pay for it. Would that make genetic enhancement acceptable, as those seeking it experience actual effort and pain? On the other hand, and as Sandel (87) recognizes, the winners in sports, arts, and sciences are not necessarily those who expend the greatest effort but those who perform best. In Sandel’s (87) words, winners are those who “reveal excellence.” Thus, society does not value effort as much as natural talent, which is obtained with no effort at all by means of genetic lottery, even though natural born talents can be artificially – though not genetically – improved, as pointed out by Allhoff (51). But if this is the case, then there is no difference between naturally given talents and scientifically provided talents.

GENETIC EQUALITY

One of the main criticisms of genetic enhancement points to discrimination as an inevitable outcome. In light of this objection, the main problem with genetic enhancement is not enhancement *per se*, but rather its distribution (51). Compliance with equality principles, namely with genetic equality[8], requires the imposition of rules regarding the use of genetic enhancement technologies, especially while they remain scarce goods not accessible to everyone.

How to use genetic enhancement to promote genetic equality

There are several options as regards the distribution of genetic enhancement to prevent future discrimination and address current discrimination. The use of distributive justice to allocate genetic enhancement has been a core issue (41), even though the exact understating of distributive justice in this regard remains to be determined. For instance, we can apply the same reasoning to health care and education, in which the state subsidizes basic education and basic health care while extra services are paid for by the user to the extent that they are able. Loftis (41) advocates public founding as a mechanism of distributive justice. The state could provide a basic package of genetic enhancement to everyone but allow more (it remains to be determined what the limit for enhancement would be, if there is to be one) to those able to pay for it. In this scenario, the criterion limiting access to genetic enhancement would be money: those who could pay for more would have access to more. Another version of the economic criterion is based on Rawls’ proposal, so that the economically privileged would be allowed to enhance themselves so long as they also pay for the enhancement of the economically underprivileged, thus bringing genetic improvements to everyone. This version of genetic equality – inspired by a paper from Allhoff (51) – tries to rebut the objection commonly argued against genetic enhancement.[9] This is indeed a relevant problem, but it could be minimized by requiring the wealthiest to fund the enhancement of those who cannot pay for it. In a sense, this model is similar to the current tax model in social democracies: people with more income pay higher taxes so that people with less income are not deprived of healthcare and education due to their scarce economic resources.

Another possibility is to use the genetic advantages (or genetic handicaps) that each person has as criteria. Thus, we could restrict access to genetic enhancement in such a way that those already genetically privileged could not be enhanced as much

[8] I use this concept to refer to a genetic endowment able to give all people the same genetic possibilities and the power to attain the same achievements.
[9] That genetic enhancement favours the rich, as only they can afford to pay such expensive enhancements, while the ones that have no money are, once again, deprived of the opportunities that genetic enhancement can provide, thus, enlarging the gap between economic strata.

as those born without good genes. However, we do not apply this rule to non-genetic forms of enhancement. For instance, could we forbid beautiful people from undergoing cosmetic surgery and only allow it to be accessed by the less beautiful (assuming that we can classify levels of beauty)? Alternatively, could we bar more intelligent people from further access to education and provide it only to the less intelligent (again, assuming intelligence can be narrowly quantified)? Such proposals may seem strange, but if we seek to create real genetic equality, they may be the solutions.

Another possible option, similar to the previous one, would be to guarantee the genetically underprivileged the necessary genetic amelioration to fit what would be considered the "regular genetic standard." Genetic enhancement would be used to promote equal opportunities on the genetic path: it could be provided only to the disadvantaged, or be an alternative offered to everyone, but one providing more pronounced effects for those below the normal standard (31). For those who are already on the path, genetic enhancement would not be allowed; and the same would apply for the genetically privileged, those who are farther along that regular path. To be completely fair, the former would have to be genetically downsized so that everyone could be equal, and this obviously raises several difficulties, including whether it would be technically possible and whether it would be fair.

For a start, issues would be raised by a right to genetic immutability (88), one of the dimensions of the right to genetic identity (1). It is usually argued that this right only prevents genetic interventions that disregard the person's wishes, but not the ones that are expressly requested by the person. In a more flexible understanding, it can be stated that genetic interventions aimed to benefit the person are allowed, even if performed without the person's consent, as sometimes happens with regard to parental reproductive and genetic decisions affecting their unborn offspring or young children. This interpretation can be grounded in Article 5/b of the Universal Declaration on the Human Genome, that admits genetic interventions not based in previous consent if they are "guided by the person's best interest," which is assumed to correspond with something that is beneficial for that person. Although not consensual (16), let's assume that genetic interventions that upgrade individuals are allowed by the right to genetic immutability. It does not follow, though, that the same is valid for downgrading interventions carried out without the person's consent, as they would not meet the best interest criterion. Even with the person's consent, a genetic downgrade would be banned if passed to future generations (germinal intervention). Current generations have duties of protection towards future generations, based on the concepts of intergenerational responsibility (89) and justice (39); thus we are prevented from intentionally passing to offspring a genetic code that is worse than they would otherwise receive. In his paper "In Genes We Trust," Powell (40) offers a detailed description of how gene editing can be way to spare future generations from the effort and the cost of dealing with negative traits, health-related or otherwise. As the author puts it, "in the absence of germline intervention, justice in the distribution of medical resources within generations will lead to prima facie unjust distributions in the genetic resources between them" (40, p.683).

An extremely relevant challenge would be to define the "regular genetic standard" and determine which characteristics would be covered. We can follow the proposal of Farrelly (57) for the characteristics that should be equalized: equal risk of disease, equal chance of living to a certain age, equal chance of attaining a certain level of intelligence, equal chance of developing certain valued physical (e.g., a certain height) and behavioural traits (e.g., initiative, cooperativeness). However, we would still need to know exactly what level of equality should be achieved.

Another hypothesis is that we can be enhanced until we reach the highest possible level for a human being (the tallest or smartest someone can be), but no more; otherwise, we would become more than human. *A maiori ad mainus*, we could not add traits not belonging to any human being, such as the ability to fly or to read minds. What we would become is a combination of our genes and the surrounding environment, and the latter is basically shaped by our economic resources. Thus, access to genetic enhancement could also be determined by the person's financial resources. On such reasoning, those with greater financial power would have restricted access to genetic enhancement, while those deprived of such resources would have greater access to genetic enhancement. Thus, some people would have more money with which to perfect themselves, while others would have better genes.

The proposals above are advanced to analyse the different connections between genetic equality and equality. None of them is a perfect solution and some are totally unfeasible. Furthermore, it would be extremely difficult to determine which characteristics are genetically superior and which are genetically deficient. As it is not easy to define what an enhancement is, it is also not always easy to tell whether a certain genetic feature is an advantage or a disadvantage. In sum, it is not easy to identify equality in terms of genetics but banning all types of genetic enhancement would not respect equality. This is true for three reasons: first, our departure points are intrinsically unequal; second, inequalities are a constant in human existence; and third, genetic enhancement could be a counterbalancing mechanism with respect to some inequalities.

The possible drawbacks of genetic equality as an aim to achieve

Assuming that we can agree on the merits of genetic enhancement to achieve genetic equality, this will not be the end of our intellectual journey, as this concept has some drawbacks. A possible criticism of genetic equality is its seeming connection with geneticism (90), that is, the belief that genes are solely responsible for our traits (70). Geneticism has a blind faith in genes and their power. I do not intend to claim that genes determine all aspects of life and that to create equality between people it is necessary to first create genetic equality. Instead, my argument is based on the supposition that genes are a valuable but insufficient tool, and the goal is to equip everyone with similar tools. Connected with this issue is the question of the priority given to genetic equality over other possible forms of equality which may be achieved, for instance, in education or in patrimony,

which Farrelly (91) calls the “currency problem.” The answer might be that genetics has a more far-reaching impact in our life and our prospects than these other elements; but if we reject genetic determinism it becomes difficult to argue that our genetic code is more decisive than these other elements.

Another drawback of genetic equality is to assume that this is, in itself, the main goal to achieve. Genetic equality, or equality in general, is not necessarily valuable. If everyone were to be put into the same position by levelling down, all would be equal, but what benefit would there be? Some would benefit from an upgrade but their equality would be achieved at the expense of downgrading others. Genetic equality should only be an aim to consider when it is achieved by levelling up the human being, that is, genetic enhancement. An equality that forces people to remain in their current conditions, or even takes some existing benefits from them, is not a value to praise but a way to downgrade humankind and human well-being.

PRELIMINARY CONCLUSIONS

Enhancement in other dimensions of life is commonly accepted. We believe that we can change (or manipulate) nature to improve our existence (via medicines or surgical interventions) and adapt it to our desires (by building planes so that we can fly). I have argued that gene editing is simply one more way to do so. While it currently lacks the same level of safety and predictability that characterize other forms of scientific enhancement, this does not mean that genetic enhancement should be banned. It simply tells us that we should continue to conduct research until we achieve satisfactory levels of safety and efficacy to use it in regular daily practice. At this point, I cannot offer an absolute defence of genetic enhancement. There are still many arguments against it that I have not addressed in this paper, and some of them may be strong enough to justify the ban of this practice. I have instead focused on arguments related to genetic equality, which state that the initial distribution of genetic gifts by nature is anything but fair; and I made the case that genetic enhancement may be a way to create balance between natural genetic disparities. Genetic enhancement surely raises some difficulties in this regard, but most of them can, I suggest, be successfully addressed by proper regulation, namely by providing genetic enhancement to everyone and subsidizing it if necessary. In the end, in the words of Cohen et al., it will be better to have a system in which everyone can be genetically enhanced than a system in which no one can (25): “We conclude that the moral case in favour of pursuing GGE [germline gene editing] is stronger than the case against and that pursuing GGE is thus morally permissible and morally desirable” (92, p.499).

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