

Unequal access to reprogenetic cognitive enhancement due to consistently high costs

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A [survey study by Haining et al.](#) reported a significantly higher approval rating of human cognitive enhancement with reprogenetic technologies such as polygenic embryo screening and germline gene editing among Singaporean versus American respondents. The intensely competitive educational landscape in East Asian Confucian societies such as Singapore is anticipated to create a highly profitable niche market for human cognitive enhancement. Many prospective parents are likely to view such emerging technologies as a quick, effective and expedient means of enhancing their children's future academic achievements and life prospects, leading them to readily invest substantial sums of their hard-earned money into these innovative solutions.

Given the anticipated high demand, it is expected that such cognitive-enhancing technologies will be launched at premium prices by enterprising tech companies, making them accessible only to affluent families. Additionally, tech companies involved in creating these products and services will face significant pressure from their shareholders to recoup the considerable investments made in research and development, while also striving to maximize profits from their exclusive patent rights and the high market demand for these innovative technologies upon their debut.

Nevertheless, it can be argued that although the initial expenses associated with emerging technologies may be rather high at their inception, significant demand coupled with ongoing technological advancements can enable tech companies to improve production efficiency and cost-effectiveness. This, in turn, can lead to a reduction in per-unit costs through mass production and consumption, a concept referred to as "economies of scale".

For example, the first cell phones and personal computers were prohibitively expensive when they first appeared in the market. However, over time, prices significantly decreased due to improvements and innovations in manufacturing technology, economies of scale achieved through mass production, the expiration of exclusive patent rights, and competitive pricing as an increasing number of companies entered the market. As a result, these devices are now widely accessible for mass consumption, even among low-income individuals.

Reducing the costs of such innovative technologies could possibly make larger families more appealing to couples in East Asian Confucian societies such as Singapore. Rather than dedicating extensive time and resources to the education and development of a single child, prospective parents might opt for such innovative technological solutions from the outset. This approach would enable them to confidently beget more offspring with the assurance that they would not need to invest as much time and effort in their upbringing, as these initial enhancements would alleviate uncertainties in child development. While education and training would still be necessary, the overall burden would be reduced, assuming that the cognitively enhanced offspring would already possess certain innate abilities and talents.

However, a flaw in this argument is that permitting cognitive enhancement through reprobnetic technologies would only exacerbate the “Red Queen” effect, whereby increasing time, resources and effort would be required from parents to nurture their cognitively enhanced offspring, just to keep up with peers who have also received similar cognitive enhancements.

The Singapore educational system practices streaming based on standardized examination and test scores, which leads to children of similar academic ability being grouped together in the same school and class. This will inevitably accentuate academic and social competition among the cognitively-enhanced, who would most likely be placed within the same peer group. Hence, a paradoxical situation might arise whereby anxious parents have to spend more money on advanced tuition classes for their “more intelligent” cognitively-enhanced offspring due to intensified peer competition.

Yet another fallacy in this argument is the inherent limitations on the extent to which the prices of such emerging technologies can be reduced through economies of scale via mass consumption. For instance, in the realm of electronic devices such as smartphones, laptops and tablets, mass production has significantly reduced per-unit manufacturing costs.

However, this principle does not apply to new medical technologies that require personalized treatment and labor-intensive surgical and laboratory procedures. Take dental implants as an example; this established technology has been in use for several decades. Although large-scale production can certainly reduce per-unit material manufacturing costs through economies of scale, the medical fees associated with personalized treatment and complex surgical procedures performed by highly skilled dental surgeons will always remain high, being dependent on and correlated to inflation and living costs. As a result, the costs of dental implants will consistently remain high due to the labor-intensive nature of dental implant surgeries, which require well-trained and proficient professionals, as well as technologically-sophisticated instruments and equipment.

In a similar vein, although the per-unit material costs (i.e. chemical reagents) required for polygenic embryo screening and gene editing may decline with increased production, the labor-intensive nature of such reprobnetic technologies will ensure that they will always remain expensive. This is attributed to the complex laboratory and surgical procedures required for human clinical assisted reproduction, which must be performed by highly skilled and experienced medical professionals.

Additionally, it must be noted that state subsidies are neither economically feasible nor politically acceptable in this case. It is anticipated that there will be insufficient political motivation for governments and health authorities worldwide to subsidize such human enhancement technologies, not only due to their substantial costs but also because these new medical advancements are not essential for sustaining life or health.

In the context of Singapore's multiracial society, characterized by significant socioeconomic disparities among different ethnic groups, extensive uptake of such reprobnetic technologies for cognitive enhancement could further exacerbate existing social inequalities. Such developments may result in the further marginalization of ethnic minorities, thereby exacerbating interracial tensions, ultimately undermining the Singaporean government's lofty initiatives aimed at fostering a more harmonious, inclusive, and cohesive society.

Worse still, the high costs of such technologies might lead to unequal access even within the same family. For example, some parents may not be able to afford cognitive enhancement for their first child, but might have saved enough money to cognitively enhance their second and subsequent children. This could lead to accusations of parental favoritism, sparking jealousy and resentment between siblings, thus disrupting family harmony. Hence, it is imperative that Singapore healthcare policymakers carefully consider the potential social repercussions of permitting such emerging reprobnetic technologies for human cognitive enhancement.

Paper: [Caveats on human cognitive enhancement technologies based on the sociocultural context of Singapore](#)

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