

CORRESPONDENCE

These letters respond to the Commentary 'Towards responsible use of cognitive-enhancing drugs by the healthy' by Henry Greely and colleagues (*Nature* **456**, 702–705; 2008).

Risks and benefits may turn out to be finely balanced

SIR — This Commentary is the latest in a series of expert-led deliberations on the prospects and implications of cognitive-enhancing drugs (see, for example, refs 1–3). Much of the debate on enhancement, as illustrated by the Commentary, is highly speculative and rests on assumptions that are not well grounded in evidence or experience. There are three key problematic areas.

First, efficacy — the claimed and assumed benefits are often exaggerated. Careful analysis of trial data suggests that any cognitive-enhancing effects of these drugs in healthy humans are at best modest and mixed, and at worst little better than placebo.

Second, safety — very few drugs are completely without adverse effects, especially when used chronically. In the absence of data on the long-term safety implications of these drugs, it is premature to be helping society "accept the benefits of enhancement" when the balance between risk and benefit might be much narrower than assumed.

Third, demand — there is little empirical evidence that large numbers of people will use (or are interested in using) enhancers on a routine basis. There is partial or anecdotal evidence of use in specific situations (for example, examinations), but equally, other partial or anecdotal evidence suggests considerable resistance to chronic use among the general public.

If enough positive assumptions are made about these key issues, then almost any technology can look attractive or inevitable. The speculation offered in the Commentary may be of interest to academic debates in philosophy.

But what is needed is realism, based on a more sober evidence-based assessment that does not create unrealistic expectations about either the potential benefits, or the threats, to individuals and society.

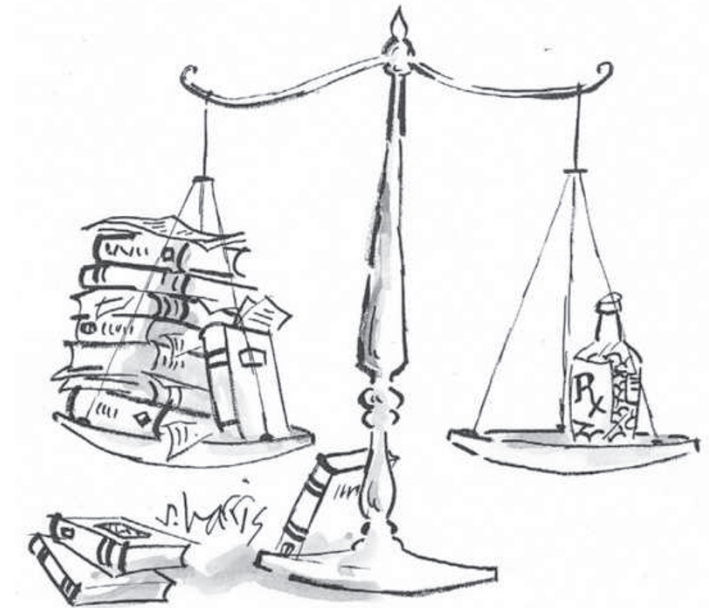
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1. Academy of Medical Sciences *Brain Science, Addiction and Drugs* (AMS, 2008).
2. British Medical Association *Boosting Your Brain Power: Ethical Aspects of Cognitive Enhancements* (BMA, 2007).
3. *Foresight Drugs Futures 2025?* (UK Department of Trade and Industry, 2005).

Much ado about cognitive enhancement

SIR — Henry Greely and colleagues call for answers to several controversial questions regarding the use of drugs by healthy people to boost cognitive performance. The most important scientific and ethical concern they raise is safety, not least because the pressure that leads people to enhance their performance might also be a crucial trigger to mental disorder. This is particularly likely when combined with sleep deprivation and anxiety caused by aggressive competition, as we have already learned from the indiscriminate use of amphetamines.

However, it would not be surprising if the repurposing of these drugs has less of an impact than expected by some and feared by others. Myriad personality traits are just as important as memory or 'intelligence' in the overall scheme of a successful life. Studies of gifted or 'savant'



children show that self-confidence, discipline, focus, drive, resilience and social skills are highly complex personality traits, often found in successful people (see, for example, E. Winner *Gifted Children: Myths and Realities*; Basic Books, 1996).

Using medications to improve cognitive performance might be relevant in the short term. But a fully successful future will always depend on two very singular human features: eagerness to excel and setting a high standard of achievement.

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A medical view of potential adverse effects

SIR — Most seasoned physicians have had the sobering experience of prescribing medications that, despite good intentions, caused bad outcomes. They would call for

louder notes of caution than those expressed in this Commentary when considering the safety of 'cognitive-enhancing' drugs such as Ritalin and Adderall.

The authors do not mention the US Food and Drug Administration warning on the packets of both of these drugs. Printed in capitals in a black box, it includes phrases such as: "amphetamines have a high potential for abuse. Administration of amphetamines for prolonged periods of time may lead to drug dependence ... Misuse of amphetamine may cause sudden death and serious cardiovascular adverse effects."

This warning does not cover other rare but serious side effects, such as Stevens-Johnson syndrome (a serious skin reaction) or toxic psychosis. Furthermore, the incidence of serious cardiac arrhythmias is likely to be higher in older people with incipient cardiovascular disease — likely consumers of 'healthy' enhancement.

Further reason for caution in advocating neuroenhancers is the disproportionate advantage the