

Neuroenhancement Discourses: Canada and the United States

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Introduction

We often think of health, treatment and rehabilitation in relation to achieving what is typically 'normal' for the human body (1). However, treatments that were designed for rehabilitative and restoration purposes are increasingly being used with the intention of bringing oneself *above* what is average for humans (2). Neuroenhancement of the 'healthy by using medication developed for 'neuro diseases' is a recognized issue [3]. A recent survey of 1427 readers of the journal Nature revealed that 79% felt that healthy people should be allowed to take cognitive enhancers [4]. A nationally representative survey of over ten thousand college students showed that 6.9% of respondents had used stimulants for non-medical reasons in their lifetime[5]

Purpose

Medication and therapeutic assistive devices developed for 'neuro diseases' are increasingly thought of and used for neuroenhancement (cognitive enhancements) purposes. The study whose results are presented investigated the coverage of neuroenhancement (cognitive enhancement) in Canada and the USA. Data was obtained from peer-reviewed articles, newspaper articles, government websites, clinical trial websites, thesis repositories, medical and rehabilitation professional organization websites and research funding agencies.

Methods

Basic keyword searches and frequency counts of various phrases (see Table 1 and Figure 1) were performed. Data sources included The New York Times online; Canadian Newsstand Database; Dissertations and Theses (ProQuest); Theses Canada Portal; Google Scholar; PubMed; National Science Foundation website; National Institutes of Health Website; Canadian Institute of Health Research website; Social Science and Humanities Research Council website; Government of Canada website; United States Government website; and organizations included in the List of American Professional Organizations

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Country	"Cognitive Enhancement" (n=706)	Neuroenhancement (n=118)
United States	299	26
United Kingdom	70	10
Germany	31	40
Canada	33	8
Spain	22	1
Australia	17	7
Brazil	15	2
Netherlands	14	3
India	13	1
Japan	10	3
Taiwan	4	1
China	8	0
Korea	3	0
Thailand	2	0
Singapore	1	0
Malaysia	1	0

Table 1. Country origin of authors of academic articles (published January-October 2011) on neuroenhancement and cognitive enhancement using Google scholar



Image from: <http://www.gehirn-und-geist.de/alias/dachzeile/gehirn-geist-das-memorandum/1008082>

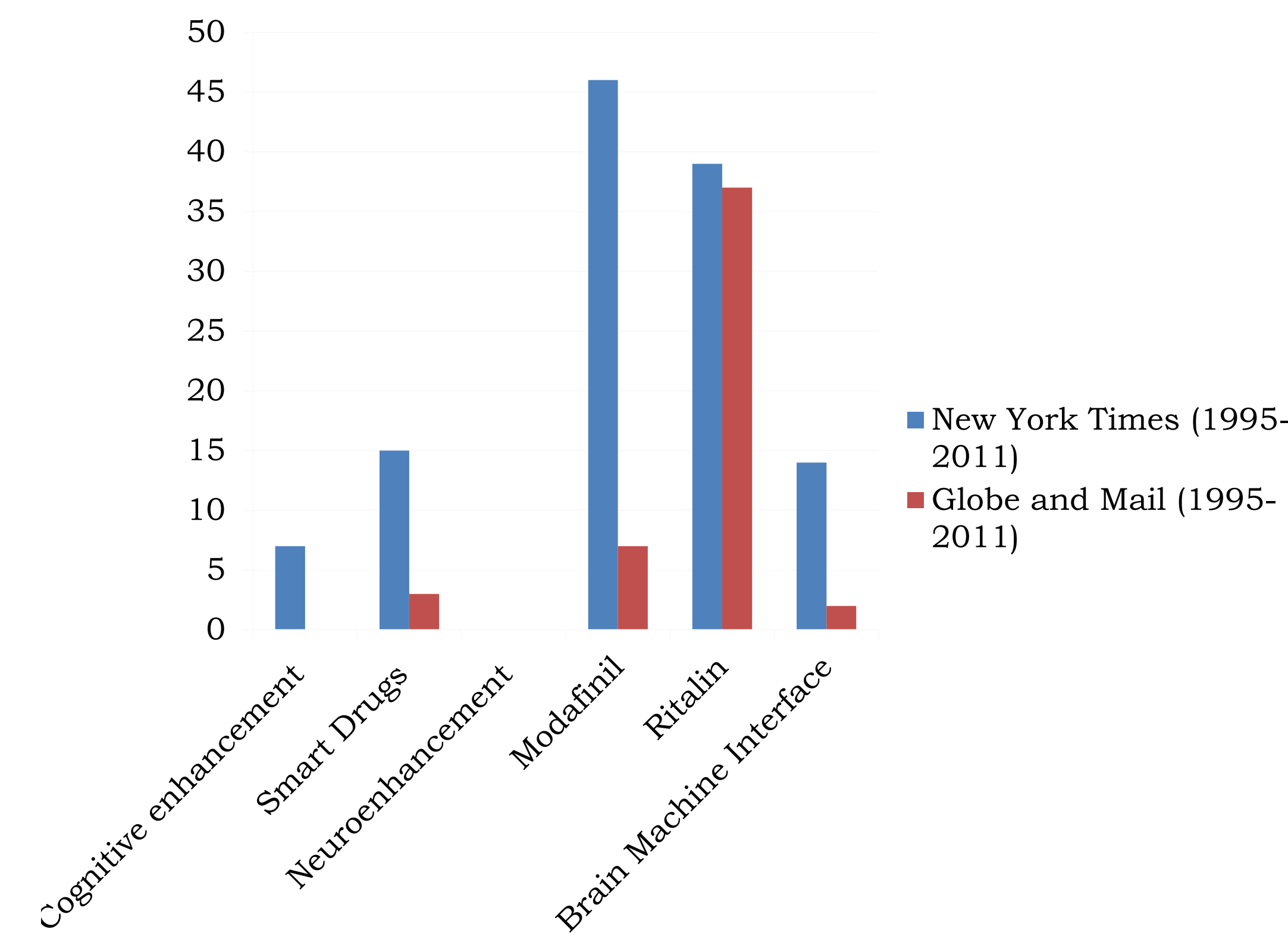


Figure 1. Frequency of keywords in the New York Times and Canadian Newsstand.

	Pubmed	Google Scholar	National Science Foundation—Full website	National Science Foundation—Funding	National Institutes for Health (website)	Gov't of Canada website	United States Gov't Website
"Human enhancement"	35	2310	13	3	8	0	294
Neuroenhancement	20	613	0	0	7	0	164
"Cognitive enhancement"	311	6880	2	0	117	0	1 550 000
"Cosmetic neurology"	13	244	0	0	0	0	67

Table 2. Frequency of neuroenhancement related keywords on various websites.

Results

Overall, we found low visibility of neuroenhancement

- 21 theses (20 American, 1 Canadian) mentioned the phrase "cognitive enhancement", and no theses contained the term "neuroenhancement"
- Using enhancement as a keyword, only four grants were found to be awarded to projects pertaining to neuroenhancement beyond the norm by the Social Science and Humanities Research Council of Canada (SSHRC); two by the Canadian Institute of Health Research (CIHR); one by the National Institute of Health (NIH) (USA); and none by the National Science Foundation (NSF).
- Table 1 shows that very few articles are published related to neuro/cognitive enhancements, particularly in Canada
- Figure 1 shows the frequency of terms related to neuroenhancement in the New York Times and the mean frequency of 300 Canadian newspapers.
- Table 2 shows the frequency of various keywords/phrases on a selection of academic websites, as well as the United States and Canadian government websites
- Of approximately 1800 websites for medical and rehabilitation organizations (USA) and 203 national organizations in Canada, only 3 in the USA and zero in Canada covered neuro/cognitive enhancements beyond what is 'normal' on their webpage. Only one gave guidance as to what to do with neuroenhancements (American Academy of Neurology).
- Webpages that list clinical trials underway in Canada and USA showed that no clinical trial was listed which was related to neuro/cognitive enhancement beyond the normal given as a goal.

Discussion

Although products are developed and used for cognitive/ neuroenhancement beyond the normal (1), the analysis of its visibility reveals a lack of coverage on the topic. Neuro/cognitive enhancement beyond the normal comes with a variety of consequences. For example, while neuroenhancers may be expected to increase productivity, people may begin to feel unfairly pressured into using such enhancements to keep up with competition (6). Additionally, the use of enhancements could cause marginalization between the enhanced and the unenhanced. Such consequences require societal discussion. The results of this project signify a need for higher visibility of neuro/cognitive enhancement in scholarly and gray literature to ensure that society is better prepared for the ramifications that accompany neuroenhancing drugs and other devices as they become increasingly available.

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