Legal and Ethical Considerations of Pharmaceutical Cognitive Enhancer Use in South Africa: Towards a Legal Framework

By

AVI BARIT

27161316

Submitted in fulfilment of the requirements for the degree

Doctor of Philosophy

In the Faculty of Law
at the
University of Pretoria

Date
October 2019

Supervisor: Prof Dr P A Carstens

Summary

The advancement of medicine around the world is happening at a rapid speed. There is not a day that one does not hear about a disease being cured or a wonder-drug being developed. Medicine has always been a field that treated a sick patient to bring that person back to “normal” function, which could be said to be the state he or she was in before acquiring the disease in question. However, due to scientific breakthroughs humanity is in a position that historically it has never been before. A place where a person can increase their mental and physical performance using pharmaceuticals to a level where genetics and upbringing alone would not have allowed.

Pharmaceuticals have been created which can do for the brain what has been done for the body. These drugs provide an avenue in which a person’s cognitive functions can be increased beyond what was otherwise possible. The ethical and legal dilemmas posed by prescribing or allowing people to use nootropics is hotly debated. Greely, a leading figure in the bioethical debate, in connection with nootropics, has stated that the ethical concerns comprise three main aspects: safety, fairness and coercion.[1] It is clear that these three aspects cover a wide ambit. The arguments for and against nootropics will not merely be rehashed but rather placed into the South African context to ascertain how best to provide for the ethical concerns relevant to South Africa. The ethics of nootropic use will be examined through the lens of the Beuchamp Childress model which determines ethical problems using the principles of autonomy, justice, beneficence and non-maleficence.

The aim and contribution of this thesis will be to build a legal framework for the use of nootropics in South Africa, to create this one must ascertain what the current legal position is. Law is built from precedent in context of case law and legislation. The current law will be examined to see what can be used, what may need to be discarded and what would need to be added. A layered approach is used to determine what the legal position in South Africa currently is. A layered approach looks at the constitution and proceeds to legislation, case law, and legal articles and books. A major aspect around the use of nootropics will be informed consent and how it relates to the use of nootropics especially with regards to adolescents i.e.

under 18 years of age. This thesis follows an MPhil in Medical Law and Ethics which outlined the doctrine of informed consent in South Africa and thus allows for the application of this doctrine to a pressing issue in South African society.

Dedications

Without certain people this thesis would never have materialised. I am grateful to:

Prof Carstens, thank you for infecting me with your love of medical law and ethics.

Dad, thanks for instilling in me a love of learning.

Tamara, thank you for encouraging and believing in me.

DECLARATION OF ORIGINALITY

UNIVERSITY OF PRETORIA

The Department of Public Law places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation.

While academic staff teach you about referencing techniques and how to avoid plagiarism, you too have a responsibility in this regard. If you are at any stage uncertain as to what is required, you should speak to your lecturer before any written work is submitted.

You are guilty of plagiarism if you copy something from another author's work (eg a book, an article or a website) without acknowledging the source and pass it off as your own. In effect you are stealing something that belongs to someone else. This is not only the case when you copy work word-for-word (verbatim), but also when you submit someone else's work in a slightly altered form (paraphrase) or use a line of argument without acknowledging it. You are not allowed to use work previously produced by another student. You are also not allowed to let anybody copy your work with the intention of passing if off as his/her work.

Students who commit plagiarism will not be given any credit for plagiarised work. The matter may also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University.

The declaration which follows must accompany all written work submitted while you are a student of the Department of Public Law. No written work will be accepted unless the declaration has been completed and attached.

Full names of student: Avi Barit

Student number: 27161316

Topic of work: Legal and Ethical Considerations of Pharmaceutical Cognitive Enhancer Use in South Africa: Towards a Legal Framework

Declaration

1. I understand what plagiarism is and am aware of the University's policy in this regard.

2. I declare that this Thesis (eg essay, report, project, assignment, dissertation, thesis, etc) is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.

3. I have not used work previously produced by another student or any other person to hand in as my own.

4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

SIGNATURE A. Barit

Table of Contents

EXPLANATORY NOTE ON SOURCE REFERENCING AND BIBLIOGRAPHY

- Footnotes are used throughout the thesis to recognise the sources referred to. In each chapter, footnotes will resume from footnote 1 to assist with readability.
- Where a source is referenced in different chapters, the first occurrence in each chapter will be a full reference.
- A complete list of sources is provided in the form of a bibliography at the end of the thesis.
- The bibliography is compiled by listing all sources cited in the footnotes in full and not only by listing principal sources to ensure a comprehensive resource list.
- In the footnotes, the initials of an author are provided only in the first occurrence of the reference within each chapter. Thereafter, only surnames are used when indicating the reference.
- The publisher of a textbook, where it could be determined, is only mentioned in the bibliography, and not in the footnotes.
- Where multiple sources from the same author is used, for clarity reference is made to the year of publication. Where multiple contributions are published in the same year, reference is made to the title of the source.
- Citations are given as follows:

    - Journal articles are referred to for the first time as: CA Verster and AA Van Niekerk 'Moral perspectives on stimulant use by healthy students' (2012) 102(12) *SAMJ*. 909-11. The second citation of a journal article is given as: Verster and Van Niekerk (2012) 910.
    - Textbooks are referred to for the first time as follows: TL Beauchamp and JF Childress *Principles of biomedical ethics* (2001). Textbooks are referred to the second time as: Beauchamp and Childress 370.
    - Edited books are referred to the first time as: K Moodley (ed) Medical ethics, law and human rights: a South African perspective (2010) at 57. The second citation will read as follows: Moodley (ed) (2010) 63.
    - A thesis or dissertation is referred to for the first citation as: FW Van Oosten *The doctrine of informed consent in medical law* (1989) unpublished LLD thesis University of South Africa at 9. The second citation reads as follows: Van Oosten (1989) 2.

- A chapter in an edited textbook is cited for the first time as T Metzinger and E Hildt ‘Cognitive enhancement’ in J Illes and B Sahakian (eds) *Oxford Handbook of Neuroethics* (2011) 245–64. The second citation reads: Metzinger and Hildt (2011) 250.
- Legislation is cited as: National Health Act 61 of 2003.

Chapter 1: Introduction

1.1 General Introduction

The advancement of medicine around the world is happening at break-neck speed. There is not a day that goes by where one does not hear about a disease being cured or a wonder-drug being developed. This has allowed society to bring communicable diseases to their knees. Today, the biggest causes of death not only in the developed world but also in South Africa are non-communicable diseases, which in 2016 accounted for 57.4% of all deaths in South Africa.[1] Medicine has always been a field that treated a sick patient to bring that person back to "normal" function, which could be said to be the state he or she was in before acquiring the disease in question. However, due to scientific breakthroughs humanity is in a position that historically it has never been before. It is at a place where a person can increase their performance using pharmaceuticals to a level where genetics and upbringing alone would not have allowed. It is clear that in the physical sense this can be seen not only in the bodybuilding industry but also in all physical sports where the use of performance-enhancing drugs have had to be banned because of the "edge" that it gives to these athletes.

Now medicine has gone one further. Drugs have been created which can do for the brain what has been done for the body. This new field of pharmacology is called "Nootropics". The Online Oxford English Dictionary[2] defines a nootropic as: "(of a drug) used to enhance memory or other cognitive function". These drugs provide an avenue in which a person's cognitive functions can be increased beyond what was otherwise possible. To enhance can mean different things depending on what is described. When dealing with cognitive enhancement Metzinger's definition will be used, which states that cognitive enhancement is any intervention that "aims at optimizing a specific class of information-processing functions; cognitive functions, physically realized by the human brain".[3]

---

[1] Statistics South Africa (2016) Mortality and causes of death in South Africa, 2016: findings from death notification.

[2] Nootropic. Available at: https://en.oxforddictionaries.com/definition/nootropic (Accessed on 6/02/2017).

[3] T Metzinger and E Hildt 'Cognitive Enhancement' in J Illes and B Sahakian (eds) *Oxford Handbook of Neuroethics* (2011) 245–264.

However, with great power comes great responsibility and the field has already generated criticism from those who find nootropics as ethically questionable as doping while playing sports. Furthermore, because these drugs are also used in the treatment of other diseases[4] some argue that they should be strictly regulated and should not be prescribed or allowed to be bought by those who do not "need" them for treatment purposes.

The statements made in the previous paragraph are loaded with legal and ethical ramifications. These must be meticulously examined for this burgeoning field to be able to be used in such a way as to benefit all of society.

The ethical dilemmas posed by prescribing or allowing people to use nootropics are hotly debated. Greely, a leading figure on the bioethical debate, in connection with nootropics, has stated that the ethical concerns comprise three main aspects: safety, fairness and coercion.[5,6] These three aspects cover a wide ambit. This thesis will not merely rehash what has already been said about this but rather use these arguments and place them into the South African context to ascertain how best to provide for the ethical concerns relevant to South Africa.

There are and have always been a litany of objects, drugs and herbal remedies that purport to be cognitive enhancing. The medical literature focuses on a few drugs that have been found to have cognitive-enhancing functions such as increased attention and focus. It is these drugs that shall be focused on in this thesis. The drugs are caffeine, methylphenidate, amphetamines, and modafinil.[7] These drugs have shown that cognitive enhancement is possible. However, to know that something can be done does not mean that it should be done.

1.2 The legislative framework of nootropics

[4] These diseases include: Parkinson's disease, dementia and attention deficit hyperactivity disorder (ADHD).
[5] HT Greely 'Enhancing Brains: What are we afraid of?' (2010) Jul 14 *Cerebrum*.
[6] HT Greely et al 'Towards responsible use of cognitive-enhancing drugs by the healthy' (2008) 456 (7223) *Nature* 702-5.
[7] Ibid.

To build a legal framework, one must ascertain what the current legal position is. Law is built from precedent in the context of case law and legislation. The current law needs to be examined to see what can be used, what may need to be discarded and what would need to be added. A layered approach will have to be used to determine what the legal position in South Africa currently is. A layered approach starts with looking at the constitution and proceeds to legislation, case law, and goes onto legal articles and books.

The preamble of the Constitution of South Africa, 1996 states:[8]

"Republic of South Africa - Section 1: The Republic of South Africa is one, sovereign, democratic state founded on the following values: (a) Human dignity, the achievement of equality and the advancement of human rights and freedoms".[9]

It is clear from this that the Constitution places a high value on human dignity and equality. It will be argued that it is these rights that nootropics can help further and as such the law should be developed to allow the use of such.

The rights that every citizen has are crucial to my research, the ones specifically pertaining to the study are:

- Equality - Section 9(2): Equality includes the full and equal enjoyment of all rights and freedoms. To promote the achievement of equality, legislative and other measures designed Chapter 2: Bill of Rights 6 to protect or advance persons, or categories of persons, disadvantaged by unfair discrimination may be taken.[10] Section 9(3) further states the different grounds of discrimination. These are: race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture,

[8] The Constitution of the Republic of South Africa, 1996 (hereafter the 'Constitution, 1996').
[9] S 1.
[10] S 9(2).

language and birth. None of these may be used by the state to discriminate against anyone.[11]

- Dignity – Section 10: Everyone has inherent dignity and the right to have their dignity respected and protected.[12]
- Freedom and Security of the Person – Section 12(2): Everyone has the right to bodily and psychological integrity, which includes the right … (b) to security in and control over their body.[13]
- Privacy – Section 14: Everyone has the right to privacy, which includes the right not to have— (a) their person or home searched; (b) their property searched; (c) their possessions seized; or (d) the privacy of their communications infringed.[14]
- Health Care, food, water and social security – Section 27(1): Everyone has the right to have access to— (a) health care services, including reproductive health care;[15]
- Children – Section 28: A child's best interests are of paramount importance in every matter concerning the child.[16]
- Interpretation of Bill of Rights – Section 39: (1) When interpreting the Bill of Rights, a court, tribunal or forum— (a) must promote the values that underlie an open and democratic society based on human dignity, equality and freedom; (b) must consider international law; and (c) may consider foreign law.[17] (2) When interpreting any legislation, and when developing the common law or customary law, every court, tribunal or forum must promote the spirit, purport and objects of the Bill of Rights.[18]

The legislative framework is the next part that must be looked at in connection with nootropics. The automatic place to look at would be the legislation concerning pharmaceuticals and prescriptions. This legislation is the Medicines and Related

[11] S 9(3).
[12] S 10.
[13] S 12(2).
[14] S 14.
[15] S 27(1).
[16] S 28.
[17] S 39(1).
[18] S 39(2).

Substances Act 101 of 1965. The focus will be on what this Act states regarding the three main drugs currently used off-label[19] as nootropics, these being: methylphenidate, modafinil and amphetamine. With regard to the legislation, it is key to understand who may prescribe these drugs. Section 22A(17) states: "'authorised prescriber' means a medical practitioner, dentist, veterinarian, practitioner, nurse or other person registered under the Health Professions Act, 1974". Furthermore, an understanding should be found as to what circumstances these 'authorised prescribers' shall be allowed to prescribe such drugs: "'medicinal purpose' means for the purposes of the treatment or prevention of a disease or some other definite curative or therapeutic purpose…". It is clear from this legislation that the medicinal purpose of a drug is to treat or prevent disease. Nootropics are used for their cognitive-enhancing effects as to enhance is defined as "to improve the quality, amount or strength of something"[20] they would not be allowed to be prescribed as they can be said to have no medicinal value for such patients.

It will be shown that the current legal framework is untenable. Medical practitioners are prescribing to these people nootropics and yet such practice is clearly illegal as stated in the legislation: Section 22(A) - "Notwithstanding anything to the contrary contained in this section, no person shall sell or administer any Scheduled substance or medicine for other than medicinal purposes." The Act in section 29 titled Offences further states that: "(k) Any person who contravenes any provision of section 22A, 22C(5) and (6), 22F, 22G or 22H or contravenes or fails to comply with any condition imposed thereunder; "Then in Section 30 titled Penalties it states: "(1) Any person who is convicted of an offence referred to in section 29 shall be liable to a fine, or to imprisonment for a period not exceeding 10 years." Thus, all these practitioners who have been and continue to prescribe these drugs illegally should, in fact, be subject to a fine or imprisonment. Given how widespread the prescription of these drugs is it is trite to say that many medical professionals, out of the already limited number of

[19] "The term 'off-label' means that the medicine is used in another way or for an indication other than those specified in the conditions of registration of the medicine and as reflected in its labelling": RM Jansen 'The off-label use of medication in South Africa – what about some information for medical practitioners?' (2009) 99(6) *SAMJ* (2009) 438 438 citing SA Strauss "'Off-label' use of medicine: some legal and ethical implications" (1998) 19(1) *SA Practice Management* 12-19.

[20] C McIntosh (ed) *Cambridge Advanced Learner's Dictionary* 4 ed (2013).

medical professionals working in South Africa, could face jail time for trying to help patients.

However even before the suggestion of a new legal framework could be proposed at the end of this thesis, there is hope on the horizon. It is in the form of the "Medical Innovations Bill" which has been introduced in the National Assembly and published in the Government Gazette in 2014.[21] This proposed piece of legislation would further the cause of nootropics. It attempts to, as its preamble states, "make provision for innovation in medical treatment…". The major reason for this piece of legislation is clearly for its legalization of medical professions to be able to prescribe cannabinoids to patients. However, this piece of legislation will be put forth as an example to show that if such can be done for cannabinoids, a substance that has been illegal for nearly a century, then perhaps it can show a way to legalize nootropics for prescription purposes. In section 2 of the Bill titled "Purposes" it states:

> The purposes of the Act are to – (1) codify existing best practices as to decisions by medical practitioners to innovate in cases where evidence-based treatment or management is not optimal or appropriate because the available evidence is insufficient or uncertain;… (3) encourage responsible innovation in medical treatment and management by supporting reasonable and logical clinical decisions.

It is clear from these purposes that the Bill is an attempt to allow medical practitioners to innovate in the medical field, a field which has notoriously been very slow to allow any innovation to be used. However, it will be argued that this piece of legislation uses an archaic definition of a "condition": "shall mean a medical condition which, if not cured, may cause the patient's death or severe impairment to his or her medical condition or quality of life." Surely, society has come to a stage where the definition of a condition should be reliant on the subjectivity of a patient as to what he or she believes to be a deficiency and therefore allow for the enhancement to allow the patient to get to the state that they desire? If this is not workable then it will be proposed that society allows for the enhancement of people's minds the same way that society allows for the enhancement of people's bodies. It has been many years since plastic surgery was allowed to treat soldiers coming off the battlefields in the early 1900s.

[21] Medical Innovations Bill, 2014

Many of the operations performed today are to augment the noses, breasts or other parts of bodies with no medical indication for such. Why not for a person's mind?

It is already clear from what has been stated before that a new framework will revolve around defining a concept of enhancement which will allow medical professionals to help patients to enhance not only their bodies through physical augmentation but also their minds through mental augmentation. It is clear from previous research that nootropics are already used in a widespread manner. A legal framework is necessary so that the benefits of this new class of drugs may be used in the most efficient, healthy and beneficial way by society at large.

In this instance, the ideas set out by Dubljevic in his various writings will be heavily drawn on[22]. Dubljevic opines that there are three models that regulation could be made; these are: It could be banned for healthy individuals as it currently is. It could be made available in a laissez-faire style where anybody and everybody is allowed to purchase cognitive enhancers as is the case today with the purchase of caffeinated drinks. He believes that a middle ground is called for whereby the model currently used in different countries around the world for tobacco purchase. He calls this model the Economics Disincentives Model (EDM) and entails a similar model to what happens in South Africa regarding tobacco control. Therefore, it will be shown how the tobacco legislation[23] in South Africa could be used to make a regulatory framework for such cognitive enhancer regulation.

For a pharmaceutical product to be used in South Africa, it must go through the South African Health Products Regulatory Authority[24]. This Council must follow the law regulating pharmaceutical use and prescription as is set out in the Medicines and

[22] Dr Velko Dubljevic is the assistant Professor of Philosophy and Science, Technology & Society (STS) at NC State. He has published many articles and books on Neuroethics and cognitive enhancers. For a full list on his achievements and publications see: https://philrel.chass.ncsu.edu/people/directory/vdublje. His articles relating to regulating cognitive enhancers have influenced my thinking on the subject greatly. These are: 'Principles of justice as the basis for public policy on psychopharmacological cognitive enhancement' (2012) 4(1) *Law, Innovation and Technology* 67-83; 'Toward a legitimate public policy on cognition-enhancement drugs (2012) 3(3) *AJOB Neuroscience* 29-33; 'Prohibition or coffee shops: regulation of amphetamine and methylphenidate for enhancement use by healthy people' (2013) 13(7) *The American Journal of Bioethics* 23-33. I will refer to them extensively in the chapter relating to the regulation of cognitive enhancers.

[23] Tobacco Products Control Act 83 of 1993

[24] Formally known as the Medicine Controls Council.

Related Substances Act 101 of 1965. Since nootropics that are available are all actively used in the treatment of other diseases, they too are controlled by the aforementioned body and legislation.

The criteria for medical practitioners to prescribe these drugs is thus dictated by this council and it is to them that attention will be drawn. However, it must be asked, whether ethically and legally, doctors should be able to prescribe medication to those that do not wish to use it for the treatment of disease but rather for the increase of cognitive performance? Should nootropics that are safe be made available straight to the general public without having to go through medical practitioners? Are nootropics ethically indefensible as another means for the rich to increase their performance over the poor?

1.2 Ethical guidelines in South Africa

In South Africa, the body that regulates and guides[25] the medical profession is the Health Professions Council of South Africa (HPCSA)[26]. It is important to scrutinize their stance, if any, of the administration of nootropics by medical practitioners to their patients as well as the HPCSA guidelines as they pertain to the prescribing habits of doctors.

Book 2 of the HPCSA guidelines[27] section 23(5) states:

> "A practitioner may prescribe or supply medicine or a medical device to a patient: Provided that such practitioner has ascertained the diagnosis of the patient concerned through a personal examination of the patient or by virtue of a report by another practitioner under whose treatment the patient is or has been and such medicine or medical device is clinically indicated, taking into account the diagnosis and the individual prognosis of the patient, and affords the best possible care at a cost-effective rate compared to other available medicines or medical devices and the patient is informed of such other available medicines or medical devices."

[25] HPCSA Overview [Accessed on 31/08/2019] https://www.hpcsa.co.za/About: "the Council guides and regulates the health professions in the country in aspects pertaining to registration, education and training, professional conduct and ethical behaviour, ensuring continuing professional development, and fostering compliance with healthcare standards."

[26] This is in accordance with the Health Professions Act 56 of 1974. The functions of the HPCSA are specifically set out in s 3 of this Act.

[27] HPCSA Ethical and Professional Rules of the Health Professions Council of South Africa: Booklet 2 (2016).

It is clear from this ethical guideline that the current practice of doctors prescribing nootropics is not ethical. Firstly, the doctors have not ascertained any specific diagnosis besides perhaps that the patient would like to perform better at school, work, etc. Furthermore, the drug being prescribed is not clinically indicated as all drugs currently used as nootropics are used off-label. It is clear from this HPCSA guideline that such a rule still has the worldview that drugs are meant to treat a disease and not to help a patient achieve something above his or her normal.

1.3 The principlist approach

In medicine, the leading method to deal with ethical problems is to use the principlist approach. The principlist approach originates from the Belmont report[28] as well as the Principles of Biomedical Ethics.[29] This approach uses 4 ethical pillars[30], these are: Autonomy, beneficence, non-maleficence and distributive justice. These 4 principles are used to examine medical ethical dilemmas. Because medical law derives from the ethical considerations it is plain to see that these principles are infused in medical law.

1.3.1 Autonomy

The principle of autonomy is probably the most well known and most used ethical pillar in today's society. The direct translation of autonomy is "self-rule". It refers to the right of every person to make decisions for himself or herself.[31] People have come to demand their right to have control over their body and what to do with it. The principle implies that if a person's decisions only affect that person then the person should be able to make them without the interference of others. A patient has the right to accept or reject treatment even if that treatment could be lifesaving. Furthermore, a person has the autonomy and the right to pay for and receive plastic surgery that will alter their appearance even though such will undoubtedly result in pain. The operation has no medical benefit to the person besides for the psychological benefit the person may attain from an improved self-image. It is on this basis that it will be contended that

[28] The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research (1979)
[29] TL Beauchamp and JF Childress, currently on its 8th edition, published in 2019.
[30] TL Beauchamp and JF Childress *Principles of biomedical ethics* (2001).
[31] K Moodley (ed) *Medical ethics, law and human rights: a South African perspective* (2010) 42.

something that will enhance the cognitive ability of the user should be allowed based on the user's decision; whether or not that benefit will result from a drug that will have side-effects. Many people undergo cosmetic surgery procedures that have life-threatening risks associated with them. Yet when it comes to using cognitive enhancers, which some even refer to as cosmetic neurology[32], is looked upon as being unethical and illegal. Surely a person should have the right to decide what to put into their body and make an informed decision whether the risks are appropriate or not. This work will explore how the argument for autonomy can be used for and against the use of cognitive enhancement.

1.3.2 Beneficence

Beneficence is the principle that refers to doing good and actively promoting goodness, kindness and charity.[33] This is one of the fundamental ethics of medicine. It can be summed up as: do whatever is right by the patient. The doctor's duty is to treat the patient in whatever way possible. This drives the doctor at all times to think about what is in the ultimate best interests of the patient. If a radical surgical operation will allow the patient to live for another 6 years but the patient's quality of life is abysmal then the doctor is called upon to advise the patient of such. Surely enhancing a patient is doing the ultimate good for the patient. A medical professional is now able to use their skills to actively help the patient be better. Not just treat the patient in time of illness but actively help the patient to live a better life. This work will look at whether prescribing cognitive enhancers would be acting with beneficence towards the patient.

1.3.3 Non-maleficence

Primum non nocere – first do no harm. All medical practitioners have a duty to avoid and minimise harm to their patients. This is accomplished by thorough, sound and

[32] A Chatterjee 'The promise and predicament of cosmetic neurology' (2006) 32(2) *Journal of Medical Ethics* 110-13.
[33] Moodley (ed) (2010) at 57.

rigorous medical training and practice.[34] A medical professional is there to help patients and not to harm them. The risks of any treatment need to be weighed against the benefits that may accrue. The patient should never be harmed unless it can be justified by the ultimate good that will come of it. However, how is one to take into account this principle when dealing with enhancements. Can a person be allowed to potentially harm him/herself in order to allow that same person to overcome their natural abilities? How should the weighing of the benefits and side-effects of such drugs occur? Could it not rather be argued that in a knowledge society the benefits of the increased marks, job opportunities and income surely outweigh side effects that may be caused by cognitive enhancers?

Clinically, all drugs come with trade-offs in the form of side effects. To ascertain whether a drug is useful, it is necessary to weigh up the effects and the side effects to decide if the scale is tipped in favour of or against the use of the specific drug. When treating patients this method has constantly been observed. Medical professionals and patients decide whether the side effects of a drug would cause less harm than the beneficial effects that the drug would have on the person. For example, when a cancer patient is given chemotherapy there are bound to be severe side effects such as nausea, vomiting and loss of hair, to name a few. However, society accepts these side effects because of the benefits to the patient, i.e. long-term survival and destruction of cancer outweigh these short-term side effects.

The same method cannot apply to drugs that enhance. In this situation, the patient is already healthy and now wants to go beyond that. What should be weighed against the benefits that can accrue from such drug usage? If a person can concentrate 50% better on a cognitive enhancer but has a slight risk of increased heart disease should he be allowed to use the medication? The answer to this question has already been decided when it comes to physical enhancement. The world anti-doping association prohibits the use of steroids[35] not only because it causes an increase in performance

[34] Moodley (ed) (2010) at 63.
[35] World Anti-Doping Agency The World Anti-Doping Code: International Standard Prohibited List (2017). https://www.wada-ama.org/sites/default/files/resources/files/2016-09-29_-_wada_prohibited_list_2017_eng_final.pdf

but also because of its dangerous long-term side effects such as hypertension, osteoporosis and glaucoma.[36]

To compare physical enhancement to cognitive enhancement is not a simple task. It could be argued that sports have rules and regulations which the athletes agree to when participating in such. In daily life, this cannot be said to be the case. A person does not automatically agree not to use any method to improve his/her cognitive abilities. If one goes to the local pharmacy, you can pick up many herbal concoctions which promise to increase your cognitive abilities. Society fully accepts and endorses these products yet prescription medication that has been shown to improve cognition is frowned upon. In everyday life, people try to improve their cognitive abilities. They seek to learn new things and to do so in maximally efficient way. If they can afford it, they hire extra lessons teachers for their children and make sure they have the latest technology to use to study so that they can learn more efficiently. Yet, when it comes to pharmaceuticals that can cause enhancement many voice their opinions against.

1.3.4 Justice

Justice and more so distributive justice imply that society needs to distribute resources evenly and for the greatest good. In this instance, it is argued that these cognitive enhancers would be used by the rich to gain an even larger advantage over the poor. However, this has been the case with every other advantage. The rich have better technology available to them, better teachers and all-around better resources. To argue that because something may not be immediately available to the poor would limit what society can use in most circumstances. South Africa is a third-world country with vast inequalities that are apparent to all. Hence distributive justice needs to be closely examined in this context. The current research regarding cognitive enhancers has shown that they may act as a means to equalise the cognitive abilities of the population. This occurs because there is a zone in which optimal brain performance occurs. People with lower cognitive abilities usually fall outside this zone while these drugs can help them to reach this zone. This will be discussed in more detail in the

[36] L Brunton et al *Goodman and Gilman's the pharmacological basis of therapeutics* (2011)

clinical chapter[37]. Thus, it could be argued that there is a moral argument to use these drugs especially in a third-world country like South Africa.

1.4 Use of cognitive enhancers in the child

One of the areas that these drugs are most used is at schools, universities and other places of education. It is obvious that at a place where maximum efficiency at learning is desired such drug usage would flourish. It is also true that the vast majority of students at schools are below the age of 18[38]. This creates various ethical questions. Should parents be allowed to instruct their children to take cognitive enhancers? Parents already decide how, what, when and where their kids will study. It is necessary to ask whether parents should not also be allowed to insist or at least encourage their children to take cognitive enhancers especially if it could increase their grades which affects their chances of getting into good universities.

If a parent does encourage their kid to use cognitive enhancers and is even able to obtain them legally then what happens if the child now refuses to take the cognitive enhancers? This is no theoretical case. Many millions of children around the world are prescribed methylphenidate each year. What if these children reject the medication due to side effects? Should the parent be able to force the child to take it or should the child's autonomy take preference? Does the child have autonomy at such an age and perhaps the real question is at what age the child can be considered to have autonomy? Such questions will be explored in detail in the paediatrics chapter[39] of this work. Cognitive enhancer use in adolescents is something that is not going to disappear due to wishful thinking and thus it is important to understand the ethics behind such use if a comprehensive legal framework which will also include the use of cognitive enhancers by children is to be found.

[37] Chapter 2
[38] Statistics South Africa General Household Survey. (2018) This survey showed that above 86% of all youths between 5 and 17 are in primary or secondary school whereas only 41% of those aged 19 are in secondary school. This further drops to 24.7% of all those aged 20.
[39] Chapter 3

The Constitution provides protection to children[40]. It begs the question of whether giving nootropics to children would be in their best interests. If it is then would parents be able to consent to their children taking nootropics? What about forcing their children to take nootropics to increase their marks even when the child does not want to take such pharmaceuticals?

In this regard, one needs to turn to the legislation pertaining to children as set out in the Children's Act of 2005. In section 129 titled, Consent to Medical treatment and surgical operation: "(1)…(2) A child may consent to his or her own medical treatment or to the medical treatment of his or her child if - (a) the child is over the age of 12 years; and (b) the child is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the treatment." Thus, it would seem that a child as young as 12 years of age could refuse nootropics even if his or her parents would like them to use it. However, the wording here again causes an issue. That being "Medical Treatment" which nootropics do not fall into. Thus, it would seem that it would be prudent to turn to the ethical principles of autonomy which would come up against beneficence in this context.

1.5 Relevance to nootropic use

The drugs focused on in this thesis, as has been stated before, are Methylphenidate, Adderall and Modafinil. Yet, the purpose of this thesis is not merely to address the questions of use surrounding these drugs. The intention is to provide the tools to ethicists and policymakers to determine whether nootropics should be allowed in society or not. Fukuyama rightly states that even if these drugs fall out of favour because of unanticipated side effects, others will simply come to replace them which are more sophisticated, powerful and targeted effects.[41] There is no doubt that due to economic incentives these drugs will continue to be researched and invented. The goal of this thesis is to create an ethical and policy framework which will help to allow for the ethical and legal use of cognitive enhancers in the interest of helping society use them for the betterment of all.

[40] s 28 "Children" The Constitution, 1996
[41] F Fukuyama *Our posthuman future: consequences of the biotechnology revolution* (2002).

1.6 Research of cognitive enhancers in South Africa

The lack of adequate research into cognitive enhancers on healthy subjects presents a problem. The risks and benefits of the drugs that will be referred to in this thesis, being Methylphenidate, Adderall and Modafinil, have not been adequately tested in the healthy. It should be remembered that these drugs were all given approval for use in persons with illnesses and currently are used by the healthy through sale, trade or a prescription from a doctor where the drug is prescribed off-label. For the use of cognitive enhancers to stop being that of off-label, the relevant research will need to be undertaken. The relevant ethical and legal considerations relating to the research of cognitive enhancers in South Africa will be reviewed to ascertain whether such research could be carried out in this country.

1.7 The Research Problem

Nootropics are being used in South Africa yet in many instances it would appear that such use is illegal. This research will analyse the information on the ethics and legality of nootropic use in different age groups to create a framework for the ethical and legal use and research of nootropics in South Africa.

1.8 Research Questions

This thesis will attempt to answer the following questions that are related to nootropics and their use in South Africa:

1. What is the ethical framework for nootropic use in South Africa?
2. What is the current legal framework that nootropics fall into in South Africa?
3. What would the position be regarding children using such medications?
4. Would it be ethical and/or legal to research nootropics in South Africa and if so, would this legality hold for their research in children as well?
5. Would it be possible to create a legislative framework for the use of nootropics in South Africa based on the information obtained answering the above questions and if so, what would it look like?

1.9 Research Methodology

Using the relevant clinical data available an understanding as to what nootropics should be considered as will be arrived at. The research that has already been done by others that shows the widespread use of nootropics on a theoretically illegal and unethical basis will be examined. The research will then identify what the legal and ethical considerations of the use of such drugs should be in South Africa based on the current legal framework. Concerning the legal aspects, a layered approach will be used. I.e. The constitution, legislation, case law, common law, journal articles and books. By using this method, every succeeding layer can be looked at in the context of the overriding preceding one and thus one can make sure the layers fit together. The ethical framework used will be the four pillars pertaining to medicine. I.e. Autonomy, beneficence, non-maleficence and distributive justice. The use of nootropics will be looked at with regard to each pillar to fully understand the interplay that occurs between the ethical pillars and to what should be given precedence. Lastly, the study will specifically look at the relevant concerns, legally and ethically, regarding informed consent and how it is to be adhered to with regards to nootropics (this is especially important as many nootropics would be useful for students of school-going age). Using all the above the ethical and legal questions may be answered and a possible regulatory framework will be set out to deal with nootropic availability and use in South Africa.

1.10 Limitations of this thesis

The research does not aim to fully specify or delve into every specialized circumstance where nootropics could or would be used. Thus only a few will be looked at. The research will provide a possible way forward but due to the rapidly evolving landscape of nootropics, both pharmacologically and their role in society, it is possible that certain areas that are not even in existence yet may not be discussed.

1.11 Assumptions of this thesis

This thesis attempts to make no assumptions about its subject matter. The research relating to the effectiveness of nootropics is analysed followed by an analysis of the ethical and legal position relating to nootropics. As such no assumptions have been made with regards to nootropics.

1.12 Conclusion

The burgeoning field of nootropics has resulted in many ethical and legal questions being asked. To find solutions to these problems, it is necessary to assess the use of nootropics from an ethical and legal perspective. There is no need to recreate the wheel when answering these questions. It will be shown how building upon the solid legal and ethical foundations already present in South Africa can lead us to a legal framework that would benefit society and allow those who wish to, to use cognitive enhancers.

1.13 Structure of this thesis

1.13.1 Chapter 2

The topic of nootropics will be introduced. A clinical picture surrounding the nootropics available and their effects and side-effects will be given.

Nootropics are a new field of study that has burst into reality in recent years after being mentioned in science fiction stories for many years. The first drug that was found to increase concentration was Methylphenidate commonly known by its trade name, Ritalin or the long-acting form, Concerta. These two drug names are trade names of the generic form which is Methylphenidate.[42] However, other drugs have also come to the fore. This chapter will look at the properties of the two other major prescription drugs used as cognitive enhancers, namely: amphetamines and modafinil. Caffeine will also be examined as it is by far the most used cognitive enhancer in the world. The focus will be on the effects, side effects and prevalence of use of these drugs.

[42] See https://www.concerta.net/pdfs/Prescribing_Info-short.pdf (accessed on 6/08/2017) for prescribing information for Concerta.

This will allow the reader to gain an understanding of what the use of such drugs entails and why the questions surrounding cognitive enhancers are so pertinent given their prevalence in society.

1.13.2 Chapter 3

This chapter deals with the legal and ethical issues of the use of cognitive enhancers by minors, i.e. those under the age of 18. The Constitution of the Republic of South Africa, 1996, states that the child's best interests must always be taken into account and it is with this lens that the following question shall be looked at: if and how children should be allowed to access cognitive enhancers? This task is complicated by the fact that many children with a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) are already prescribed methylphenidate in some form as a treatment for this psychiatric disease. Because of this, the black-market surrounding methylphenidate is rife as there is a legal way for children to access the drugs and then sell, give or trade it with others.

Informed consent in minors surrounding nootropics must be dealt with. Children may want to use cognitive enhancers to perform better at school. Since they are under 18, they may not be able to access cognitive enhancers without their parents' permission. Furthermore, what if their parents want them to take cognitive enhancers and they refuse. Such will be discussed in this section.

1.13.3 Chapter 4

The ethical implications of nootropic use and abuse will be looked at. This will be done by utilising the four principles set out by Beuchamp and Childress, i.e: Autonomy, Beneficence, Non-Maleficence and Justice. With regards to South Africa, a key ethical concern is distributive justice, specifically, the impact that cognitive enhancer use has on both the lower economic and higher economic individuals. There are a plethora of ethical arguments that have been put forward for and against the use of nootropic use. In this section some of the arguments which will be focused on include:

- Using nootropics as a way for the wealthy and privileged to increase their advantage over those less fortunate and therefore increase inequality in society.
- Nootropics as an instance of doping of the mind equal to or perhaps worse than doping in physical sports.

1.13.4 Chapter 5

There are already laws and regulations in South Africa that govern how drugs can be accessed. However, these laws may not be adequate or just in allowing people to access cognitive enhancers. This chapter delves into the legislation that currently controls access to drugs used as cognitive enhancers. The legislation around tobacco and alcohol will also be discussed as a starting point for assessing how such a framework may also be used for cognitive enhancers.

The legal guidelines of what currently controls the role that nootropics play in South Africa will be dealt with using the layered approach. I.e. Constitution, regulations and case law that is present in South Africa.

1.13.5 Chapter 6

This section will deal with the legal and ethical framework currently regulating the research of human participants in pharmaceutical cognitive enhancer studies in South Africa. The aim will be to see if the current framework would allow for the research of cognitive enhancers in both adults and/or children.

1.13.6 Chapter 7

This section will take the ethical and legal findings of the thesis and use them to provide a suggested regulatory framework for the use of nootropics in South Africa. This will be based on all the previous sections and will thus also form a conclusion of the current state and way forward for nootropics in South Africa. This regulatory framework will be provided in the form of an act that would be able to be used to

regulate the use and research of pharmaceutical cognitive enhancers across all age groups in society. This will be the first time that such an Act has been set out for South Africa and will be the biggest original component of this thesis. The reason for the focus on South Africa in legal terms, as opposed to a comparative study, is that our society has legal and ethical concerns that are not comparative to other societies that may have already provided draft regulations for pharmaceutical cognitive enhancer use. It could be argued that a comparative study is also called for and such could be done as the topic for another thesis.

Chapter 2: Clinical overview

2.1 Introduction

Nootropics or cognitive enhancers are pharmacological substances that are used to enhance memory or other cognitive functions[1]. Many pharmacological substances have been purported to have cognitive-enhancing effects. This chapter will provide an overview of some of the more popular cognitive enhancers that are in use today. The criteria for focusing on these specific drugs will be based on two aspects. Firstly, their widespread use amongst society in general and in South Africa. Secondly, empirical research that has been done detailing their effects and side effects. The aim of discussing these drugs is to give an overview of the main drugs used as nootropics. To understand the current nootropic landscape, one first needs to understand the type of drugs being used by the majority. However, this chapter is merely an appetizer from which a discussion can be started and not an attempt to create a pharmaceutical text on nootropics. Thus, if more information is required on any of these drugs please consult the references given.

The nootropics that will be outlined below are caffeine, amphetamine, methylphenidate and modafinil. It is obvious that caffeine is the most widely used nootropic in the world, but why the others?[2] As Greely et al.[3] stated: "The drugs most commonly used for cognitive enhancement at the moment are stimulants, namely Ritalin (methylphenidate) and Adderall (mixed amphetamine salts). … A newer drug Modafinil (Provigil) has also shown enhancement potential." These drugs can be seen as the most used cognitive enhancers. However, another reason for concentrating on them is that they are also the pharmaceuticals most commonly researched as can be

[1] Lexico. https://www.lexico.com/en/definition/nootropic accessed on 11/09/2019. The Merriam-Webster definition is similar: "a substances that enhances cognition and memory and facilitates learning". https://www.merriam-webster.com/dictionary/nootropic accessed on 11/09/2019.
[2] C Norman and M Berger 'Neuroenhancement: status quo and perspectives' (2008) 258 *European Archives of Psychiatry and Clinical Neuroscience* 110-114.
[3] HT Greely et al 'Towards responsible use of cognitive-enhancing drugs by the healthy' (2008) 456(7223) *Nature* 702-5.

seen from the various surveys that have been performed on nootropics.[4] This chapter will provide an outline of what class of drugs these fit into. In assessing the use and effectiveness of these drugs, the following will be looked at: the history of use, the mechanism of action, therapeutic use and abuse of the substance. Lastly, a summary of the known effects of the drug regarding cognitive performance and the current research into the effects seen when used by normal individuals for cognitive enhancement will be given.

2.2 Psychostimulants as a class

These drugs fall into a class of drugs known as psychostimulants. They are part of a broad class known as sympathomimetic drugs. This means that they cause their actions by producing effects that are characteristic of the sympathetic nervous system. These effects include: arousal, vigilance, increased movement, anorexia, vigour, wakefulness, and attention. As a group, psychostimulants can produce euphoria, a sense of power and confidence, and addiction, in certain individuals. These effects are what has caused the negative portrayal of psychostimulants in society. The fear of people becoming addicted to these drugs has caused a marked backlash in the literature and society, especially against amphetamines. Drug addiction is a chronic disease that is characterised by the compulsion to seek out and consume a drug, despite increasing drug-related physical and emotional problems. However, it has been seen that the addictiveness of these drugs is based on the specific route of administration together with the dose given. Research has shown that low doses of amphetamines and methylphenidate using the oral route has only a small chance of producing euphoric effects or addiction. Whereas taking the drugs in large doses or intravenously causes the drugs' potency to increase, time of action to decrease and therefore an increase in euphoria and addiction potential. Psychostimulants as a category include cocaine and methamphetamine (street name: METH) as well. These drugs, which are known to many only due to their use by drug addicts produce similar effects to those that will be discussed below. However, it should be kept in mind that even these two, if used at low doses, have been shown to cause cognitive

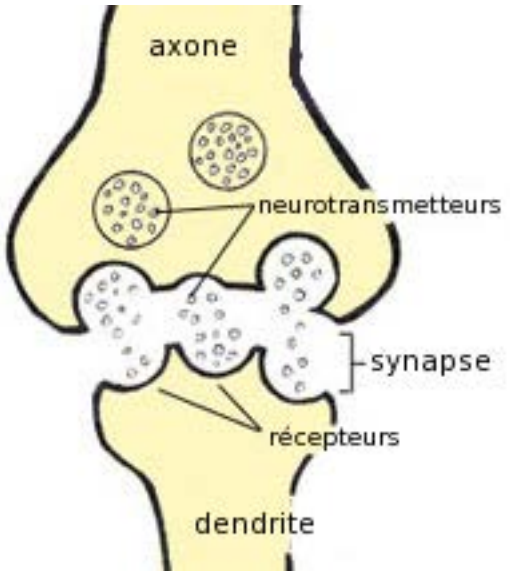
[4] Cherwell. Revealed: Oxford's addiction to study drugs. https://cherwell.org/2016/05/13/revealed-oxfords-addiction-to-study-drugs/ accessed on 11/09/2019.

enhancement without the addictive properties. Casual use of stimulants for wakefulness or performance enhancement has occurred for centuries. However, it is only in the regulated modern world where use is curtailed by strict enforcement of the law. The difference between cognitive enhancement and addiction is in the amount taken. Thus, it is understandable that many are worried that these drugs will be taken at doses that cause addiction, potentially ruining the lives of those who are addicted.

2.3 Brief introduction to neurotransmitters

The brain is made up of billions of neurons. To communicate, these neurons, have to be able to send messages to each other. However, these neurons are not directly connected. Rather, there is a small space between two neurons where they connect. This space is called a synapse. Within a neuron signals are transmitted via electrical impulses but how can this impulse cross the synapse? To communicate with another neuron, molecules have to cross the synapse from one neuron to the next to potentiate a signal. These molecules are called neurotransmitters. The sympathetic nervous system, which controls involuntary brain function such as memory, focus and attention, uses three main neurotransmitters to communicate between neurons. These neurotransmitters are: dopamine, noradrenaline and serotonin.

Below is a diagram showing two neurons. The signal is transmitted across the synapse by neurotransmitters which can bridge the space between the two nerves.



Sourced from: US Government - http://teens.drugabuse.gov/images/methamphetamines_nervecells.jpg, Public Domain, https://commons.wikimedia.org/w/index.php?curid=41354 Accessed on 4/05/2018

2.4 Side effects of drugs

It is a well-known maxim in the medical field that if: “a drug doesn’t have any side effects then it probably also doesn’t have any effects”. All side effects are just effects that happen to be unwanted. When dealing with treatments to illnesses on a day-to-day basis a patient together with her medical practitioner must decide if the benefits of taking a certain medication outweigh the risks. It is important to consider the side-effects that nootropics may have on healthy people. The exact ethics of the side-effects will be discussed in another chapter. However, in this chapter focus will be brought to bear on the side-effects specifically found in in relation to the drugs that will be focused on.

2.5 The U-shaped pattern of action

It has been observed in research that psychostimulant drugs have an action profile that looks like an inverted U-shaped curve. Donald Hebb in 1955 when describing Harold Scholberg’s “level of activation continuum” came up with his “optimal arousal theory”. To explain how this concept of arousal pertains to cognitive enhancement requires the reader to think of an inverted U. There is an optimum spot, let us call it the “zone”, that denotes the optimum cognitive performance of an individual. If they are on the right side of this zone, hyperkinesis will be found (hyperactivity and an inability to concentrate), increasing emotional disturbance, and anxiety. On the other side of the inverted-U one gradually sees that the person’s cognitive performance diminishes the further to the left one is. This explains the main action of the nootropics that will be discussed. If the said person is already naturally in the zone or close to it, then taking nootropics can cause a shift to the right side of the graph and thus the person will have a decrease in cognitive performance and exhibit the usual side effects

of stimulants such as anxiety and emotional disturbances. Whereas a person on the left side of the "zone" (given the right dose) will experience an increase in cognitive performance as she shifts towards the right.[5] This should be kept in mind when examining the ethics pertaining to the distributive justice of nootropics. The action whereby these drugs have been shown to help people with a lower cognitive ability helps us understand why this drug could be considered as an equalizer. If the "zone" is defined as the optimal level of cognitive performance, then these drugs could help everyone reach that level and act as the great equalizer of society for academic performance.

Below is a diagram showing how the U-shaped pattern of action is hypothesized to work.[6]

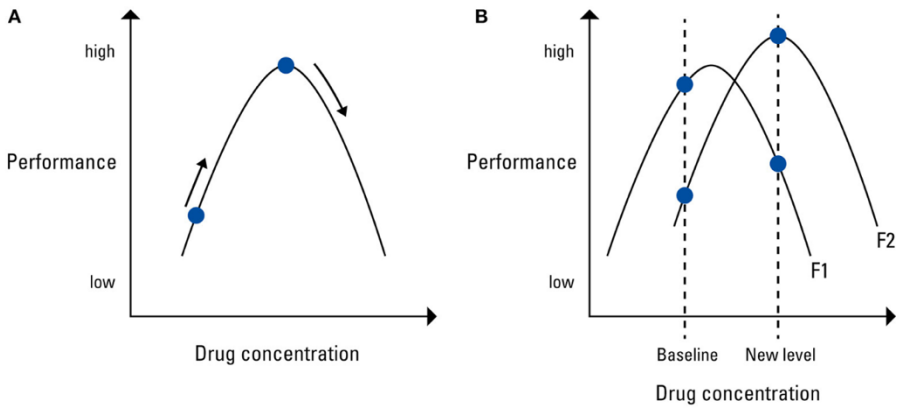


FIGURE 1 | (A) Schematic display of the inverted-U shaped function between positive effect on cognitive performance and drug concentration in the brain. **(B)** An increase in substance level might improve one cognitive function but impair another. Adapted from Husain and Mehta (2011).

2.6 Pharmacological cognitive enhancers

2.6.1 Methylphenidate

History of use: The arrival of methylphenidate onto the pharmacological scene was heralded by the Journal of the American Medical Association's Council on Drugs when

[5] R de Jongh et al 'Botox for the brain: enhancement of cognition, mood and pro-social behavior and blunting of unwanted memories' (2008) 32(4) *Neuroscience and Biobehavioural Reviews* 760 764.
[6] L Caviola and NS Faber 'Pills or push-ups? Effectiveness and public perception of pharmacological and non-pharmacological cognitive enhancement' (2015) 6 *Frontiers in Psychology* 1852.

it published its "New and Nonofficial Drugs" section in 1957. The report claimed that methylphenidate was a central nervous system stimulant which was more potent than caffeine but less so than amphetamines. In the years following this announcement, methylphenidate was used to combat many diseases. Methylphenidate has always been and continues to be one of the first-line treatments for ADHD. This is one of the reasons that its use has continually increased since first being introduced.[7]

Mechanism of action: Methylphenidate's pharmacological properties are similar to those of amphetamine. As with amphetamines, it increases the levels of dopamine and noradrenaline in the brain.[8]

Therapeutic use: methylphenidate is a schedule 6[9] drug in South Africa commonly known by its trade name, Ritalin or Concerta (extended-release dose), and has been shown in many studies to be an effective treatment for ADHD. It is indicated for this use both in children and in adults. The use of methylphenidate is recommended as a first-line treatment of ADHD with or without psychosocial interventions.[10]

Cognitive enhancement effect: The effects of methylphenidate include increasing attention and concentration of individuals.[11] It also increases the wakefulness of the individual.[12] Methylphenidate has been found to exhibit large positive effects on memory performance. It has also been found to improve inhibitory control and speed of processing; i.e. it helps a person to be less impulsive.[13]

[7] S Wood et al 'Psychostimulants and cognition: a continuum of behavioral and cognitive activation' (2014) 66 *Pharmacological Reviews* 193-221.
[8] V Dubljevic 'Prohibition or coffee shops: regulation of amphetamine and methylphenidate for enhancement use by healthy adults' (2013) 13(7) *American Journal of Biothethics* 26; R de Jongh et al (2008) 760-76.
[9] Schedule 6 Medicines and Related Substances Act 101 of 1965 (hereafter the 'MRSA').
[10] H Abikoff et al 'Symptomatic improvement in children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment' (2004) 43(7) *Journal of the American Academy of Child and Adolescent Psychiatry* (hereafter 'JAACAP') 802-11. In this study the use of methylphenidate and cognitive behavioural therapy found no additional benefit to drug treatment alone.
[11] Ibid
[12] T Kociancic et al 'Evaluation of risks associated with short- and long-term psychostimulant therapy for treatment of ADHD in children' (2004) 3(2) *Expert Opinion on Drug Safety* 97.
[13] L Caviola and NS Faber (2015) 1852.

Use for Cognitive Enhancement: Methylphenidate has been consistently shown in various studies to be widely used by students, both in school and in university. Recent studies in South Africa have shown that use by University students is a reality:

- In a recent study at the University of the Free State, medical students were surveyed and approximately 11.0% of students were found to be using methylphenidate at the time of the study, of which 67.9% used it for academic purposes.[14]
- A study also done at the University of Free State, targeted students in junior on-campus residences where students were surveyed as to whether they had used Methylphenidate. While 11.3% reported past-year use of methylphenidate, only 27.3% of those users had been diagnosed with ADHD.[15]
- In another study conducted at a South African University, it was found that one in six respondents (17.2%) had used methylphenidate in the past, even though only 2.9% had been diagnosed with ADHD.[16]
- Furthermore, in a study conducted at the medical campus of a South African University, 17% reported lifetime use of stimulants for non-medical purposes and 79% of this group reported use within the past year.[17]

It is clear from the above studies that methylphenidate use among university students in South Africa mirrors the growing use of stimulant use across the USA, Europe and other first world countries. Use of methylphenidate does not only happen through prescriptions. Many children and adults obtain methylphenidate via nonprescribed means of buying, trading or receiving pills for free.[18]

Side effects:

Main:

[14] R Jain et al 'Non-medical use of methylphenidate among medical students of the University of the Free State' (2017) 23 *South African Journal of Psychiatry*.

[15] PM van Zyl et al 'Methylphenidate use among students living in junior on-campus residences of the University of the Free State' (2017) 59(4) *South African Journal of Family Practice* 123-7.

[16] F Steyn 'Methylphenidate use and poly-substance use among undergraduate students attending a South African University' (2016) 22 *South African Journal of Psychiatry*.

[17] M Retief and C Verster 'Prevalence and correlates of non-medical stimulants and related drug use in a sample of South African undergraduate medical students' (2016) 22 *South African Journal of Psychiatry*.

[18] T Wilens et al 'Misuse and diversion of stimulants prescribed for ADHD: a systematic review of the literature' (2008) 47 *JAACAP* 21–31.

- anorexia (this is the lack or loss of appetite for food) and stomach aches.[19]
- Reduced growth: the evidence that methylphenidate causes reduced growth has not been proven. A study by Spencer, Biederman and Wilens[20] found that the reduced growth rate occurred in the ADHD group of their study regardless of whether they were on treatment or not. This suggests that a reduced growth rate is related to ADHD rather than to methylphenidate. Furthermore, other studies[21] have noted that when there is a discontinuation of medicine "catch-up growth" occurs. That is, the child tends to undergo a quicker than normal growth rate for a period of time.
- Substance abuse: A systematic review by Wilkens et al.[22] found that in their study relating to children with ADHD, it was protective against future drug-abuse.
- Cardiovascular effects: various studies have been done, some showing no increase in blood pressure while others showed an increase.[23,24] However Kociancic et al[25], in their paper, stated that: "The authors' experience suggests that long-term stimulant therapy does not cause substantive long-term cardiac effects."
- Insomnia: not observed in patients taking methylphenidate
- nervousness, possible adverse effects during pregnancy. Side effects are more likely to occur at high doses or when the drug is injected intravenously.
- Possible long-term side-effects: Again, Kociancic et al. opine that: "At present, there are no long-term side effects that have been proven to be associated with administration of these agents to children."[26]

[19] T Kociancic et al (2004).
[20] T Spencer et al 'Growth deficits in children with attention deficit hyperactivity disorder' (1998) 102(2) *Pediatrics* 501-6.
[21] SR Pliszka 'The use of psychostimulants in the pediatric patient' (1998) 45(5) *Pediatric Clinics of North America* 1085-98.
[22] Referred to by T Kociancic et al (2004).
[23] LM Greenberg and AM Yellin 'Blood pressure and pulse changes in hyperactive children treated with imipramine and methylphenidate' (1975) 132(12) *American Journal of Psychiatry* 1325-6.
[24] RL Findling et al 'Short-term cardiovascular effects of methylphenidate and adderall' (2001) 40(5) *JAACAP* 525-529.
[25] T Kociancic et al (2004).
[26] Idem 97.

2.6.2 Amphetamine

History of use: amphetamines and similar compounds have been documented for centuries. In modern times the use of ephedra and its active ingredient, ephedrine has been associated with weight loss and performance enhancement. However, the US FDA banned the sale of dietary supplements containing herbal ephedra in 2004. Ephedrine still remains for sale in certain preparations, including antihistamines and decongestants.

Ephedra was used successfully as a bronchodilator in the nineteenth century. This led the scientific community to look for a synthetic, inexpensive version of the herbal remedy. This resulted in amphetamine being marketed as an over-the-counter nasal inhaler under the name, Benzedrine (mixed amphetamine salts). Benzedrine was also administered in pill form for different ailments, including seasickness, narcolepsy, and Parkinson's disease.

The use of amphetamine for cognitive enhancement has been pursued for decades. In 1937 a study found that young male inmates displayed physical and cognitive enhancement after administration. Patients with mental disorders also exhibited an increase in IQ tests after being given amphetamines. A study conducted in 1937 by Bradley C found an improvement in school performance in nearly half of the child participants, who were at a hospital due to various behaviour disorders. This portended the use of a similar drug, methylphenidate, which is used for various behaviour disorders.

The use of amphetamines to increase academic performance was already seen in the 1930s reminding us that the pursuit and use of cognitive enhancers is not a new phenomenon amongst students. One of the first reviews of caffeine and amphetamine was published in 1962. The literature showed that amphetamine improved cognitive and physical performance.[27] It is interesting to note that when the authors of the review

[27] B Weiss B and VG Laties 'Enhancement of Human Performance by Caffeine and the Amphetamines' (1962) 14 *Pharmacological Reviews* 1-36.

were determining what the dangers are between caffeine and amphetamines for enhancement obtained by using the drugs, they felt that:

> … both from the standpoint of physiological and psychological cost, amphetamines and caffeine are rather benign agents. Except for reports of insomnia, the subjective effects of the amphetamines in normal doses are usually favourable. Moreover, no one has ever presented convincing evidence that they impair judgement. Caffeine seems somewhat less benign. … At dose levels that clearly enhance performance, the amphetamines seem not only more effective than caffeine, but less costly in terms of side effects.

Furthermore, the authors went on to opine that: "neither [caffeine or amphetamine] is addicting in the sense that narcotics are," and only "occasional individuals, usually individuals with neurotic or psychotic symptoms, habitually [take] extremely high doses."[28]

Dexedrine was introduced to the market as a more potent form of Benzedrine. In 1944, methamphetamine (Methedrine) was introduced as the most potent amphetamine. It was prescribed for hay fever, alcoholism, narcolepsy, etc.[29]

Mechanism of action: Amphetamines cause an increase in the number of neurotransmitters that are available to activate their complementary receptors. The neurotransmitters affected are dopamine, noradrenaline and serotonin. Amphetamines also inhibit monoamine oxidase enzymes which are essential in the breakdown of the dopamine and noradrenaline neurotransmitters. It also reverses the dopamine transporter action. Whereby this transporter usually transports dopamine back into the neuron, it now actively pumps dopamine into the synapse causing more dopamine to be available for use. Amphetamine is effective via oral administration and its effects last for several hours.[30]

Therapeutic Use: Amphetamine (commonly known under the trade name of Adderall) is classified as a schedule 7[31] drug in South Africa. It is most commonly used for ADHD but may also be prescribed for narcolepsy and shift-work sleep disorder. Adderall is

[28] S Wood et al 'Psychostimulants and Cognition: A Continuum of Behavioral and Cognitive Activation' (2014) 66 *Pharmacological Reviews* 193-221.
[29] Idem 201.
[30] L Brunton et al *Goodman and Gilman's the pharmacological basis of therapeutics* (2011)
[31] Schedule 7 MRSA.

not currently available in South Africa.[32] However, it is included in this chapter due to its use by wider society, especially in the USA. The main effects are wakefulness, alertness, and a decreased sense of fatigue. Elevated mood, with increased initiative, self-confidence and ability to concentrate; often elation and euphoria may occur. Performance of simple mental tasks is improved, and more work may be accomplished. Physical performance is increased which is why the drug is often abused by athletes.

Cognitive Performance: Various studies in healthy populations have found that low doses of amphetamine can improve measures of cognition especially attention and concentration. It also has a more or less decreasing effect on reaction times and effects of fatigue.[33] The use of amphetamines has been found to work according to the U-shaped response curve described above.

Abuse: As stated above, due to the euphoric effects that amphetamines produce at high doses or usage via intravenous infusion, there is a chance that someone may become addicted to the drug.

Side effects: headache, nervousness, anxiety palpitation, dizziness, vasomotor disturbances, agitation, confusion, dysphoria, apprehension, delirium, or fatigue. Adverse cardiovascular events are also a major worry. Amphetamines increase blood pressure and thus may be dangerous in individuals with high blood pressure.[34] The side effects are more likely to occur at high dosages or when injected intravenously.

2.6.3 Modafinil

History of use: Modafinil is a psychostimulant that was specifically created to treat narcolepsy and has emerged as the leading therapeutic in the treatment of sleep disorders.[35]

[32] W Vogel 'An Update on attention deficit hyperactivity disorder (ADHD)' (2014) 104(1) *South African Medical Journal* 72.
[33] V Dubljevic (2013) 26.
[34] Ibid.
[35] S Wood et al (2014) at 208.

Mechanism of action: Modafinil was originally classified as a nonamphetamine psychostimulant as its mechanism of action was thought to be different to that of amphetamines. However, subsequent analysis has shown that it may use the same mechanisms as the amphetamines. The neurotransmitters affected by modafinil are dopamine, serotonin and noradrenaline.

Therapeutic use: Modafinil, is classified as a schedule 5[36] medicine in South Africa, and commonly trades under the name of Provigil. It is approved for the treatment of narcolepsy, obstructive sleep apnea and shift-work sleep disorder.[37] Multiple studies have shown that modafinil has minimal side effects. Various studies have also shown that modafinil was equally efficacious at treating ADHD symptoms as Methylphenidate. Thus, modafinil may act as a safer alternative to methylphenidate in the treatment of ADHD.

Abuse: Modafinil has been shown to have very limited abuse potential. At therapeutic doses, modafinil does not cause euphoria. This is probably due to its slow onset of action, which takes hours, and long half-life. However, as with other psychostimulants, the chances that euphoria and thus addiction may occur is if the drug is given intravenously and at a high enough dose.

Cognitive Enhancement: Modafinil is used by students to maintain alertness. In a systematic analysis, modafinil was shown to increase alertness in normal individuals.[38] A more recent systematic analysis has again shown that when simple psychometric assessments were considered, modafinil intake appeared to enhance executive function, variably benefit attention, learning and memory, and have little effect on creativity and motor excitability. When more complex tasks were considered, modafinil appeared to enhance attention, higher executive functions, and learning and

[36] Schedule 5 MRSA.
[37] R De Jongh et al (2008) 760-76.
[38] D Repantis et al 'Modafinil and methylphenidate for neuroenhancement in healthy individuals: a systematic review' (2010) 62(3) *Pharmacological Research* 187-206.

memory.[39] Modafinil has been used in the military for years to keep pilots alert for long periods of time as well as to allow for soldiers to go without sleep for long periods of time in combat situations.[40] It consistently improves attention in non-sleep deprived as well as sleep-deprived healthy individuals. Some studies have also reported beneficial effects on spatial and numeric working memory.[41] In a series of studies, it was shown that modafinil consistently improves short-term memory and planning abilities in healthy, young volunteers[42], adults with ADHD[43] and patients with schizophrenia[44]. This shows that modafinil can help people across the spectrum of normal to those with mental disease with their memory and planning abilities.

2.6.4 Caffeine

History of use: caffeine has been found naturally in more than 60 plants, including coffee, tea, and cocoa.[45] Coffee consumption was present thousands of years ago in both Africa and the Arabian Peninsula.[46] Today caffeine is typically consumed in drinks such as coffee, tea, cold drinks. It is now used in many different products, ranging from mints to shampoos. 89% of the USA population has been found to regularly consume caffeine[47] and the per capita daily intake of caffeine in the US population has been estimated at 240mg of caffeine per day.[48] It can be expected that South Africa, with its westernised society, probably has similar rates of caffeine consumption; especially in urban and suburban areas.[49]

[39] RM Battleday and AK Brem 'Modafinil for cognitive neuroenhancement in healthy non-sleep deprived subjects: a systematic review' (2015) 25(11) *European Neuropsychopharmacology* 1165-81.
[40] Ibid; C Norman and M Berger (2008) 110-14.
[41] L Caviola and NS Faber (2015).
[42] DC Turner et al 'Cognitive enhancing effects of modafinil in healthy volunteers' (2003) 165(3) *Psychopharmacology (Berl*) 260–9.
[43] DC Turner et al 'Modafinil improves cognition and response inhibition in adult attention-deficit/hyperactivity disorder' (2004a) 55(10) *Biological Psychiatry* 1031–40.
[44] DC Turner et al 'Modafinil improves cognition and attentional set shifting in patients with chronic schizophrenia' (2004b) 29(7) *Neuropsychopharmacology* 1363–73.
[45] S Wood et al (2014) at 211
[46] Ibid.
[47] VL Fulgoni Trends in intake and sources of caffeine in the diets of U.S. Adults: 2001–2010 (2015) 101(5) *American Journal of Clinical Nutrition* 1081
[48] Ibid.
[49] Ibid.

Mechanism of action: caffeine is a legal stimulant used widely around the world, and typically not considered a drug of abuse. In South Africa, it is a schedule 0 substance.[50] Caffeine is a mild psychostimulant that produces its effects by mildly increasing the noradrenaline and dopamine levels and increasing activity of multiple areas of the brain.

Abuse: A tolerance to caffeine develops quickly to the effects of caffeine. Researchers have found that withdrawing caffeine from a person that may only drink 1-2 cups of coffee per day may cause withdrawal symptoms to become evident. These include fatigue and sedation, people who have been habituated on higher doses may have headaches and nausea.[51] Even though withdrawal symptoms have been noted, few caffeine users report loss of control or inability to reduce or stop caffeine. Thus, it is not considered an addictive substance.

Cognitive enhancement: caffeine is the most widely used psychoactive drug in the world, is in effect also the most used nootropic in the world. Its effects are mainly found in concentration and attention. The drug is used by billions of people every day for these exact qualities and yet it is completely legal and socially acceptable to consume caffeine in most forms i.e. tablet or as part of a drink anywhere in the world.[52]

2.7 Attention Deficit Hyperactivity Disorder

The psychostimulants methylphenidate, modafinil, and amphetamines have all been and continue to be prescribed for the condition known as Attention Deficit Hyperactivity Disorder (ADHD). It is thus important that the reader has a basic understanding of what this disorder is and why these drugs work in the treatment of this condition.

ADHD is a neurodevelopmental disorder affecting preschoolers, children, adolescents and adults. It is characterised by a pattern of diminished sustained attention, and increased hyperactivity or impulsivity. Research has indicated that there is a biological

[50] Schedule 0 MRSA.
[51] Ibid
[52] ibid

basis for the disorder (i.e. genetic) however there is no pathognomonic diagnostic test for ADHD (this means that there is no genetic or blood test, X-ray or MRI that can diagnose ADHD)[53]. It is thought that the neurotransmitter dopamine plays a role in the disorder. ADHD affects about 5-8% of school-aged children, with many of these continuing to be symptomatic of the disorder through adulthood. Individuals with ADHD usually have impairment in academic functioning as well as social and interpersonal situations. The condition is usually associated with learning disorders, anxiety disorders, mood disorders, and disruptive behaviour disorders. In the latest Diagnostic and Statistical Manual of Mental Disorders (DSM-V), known as the bible of the psychiatric world, has changed certain criteria for the diagnosis of ADHD. Below are the diagnostic criteria for ADHD. ADHD is defined as either inattentive, hyperactive, impulsivity or a combination of these.[54]

2.7.1 DSM V diagnostic criteria for ADHD[55]

A: A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development as characterised by inattention and/or hyperactivity/impulsivity.
Inattention - >= 6 of the following (if 17 years or older, only 5 required):

- Often fails to give close attention to details or makes careless mistakes
- Often cannot sustain attention in tasks or play activities
- Does not seem to listen when spoken to directly (mind seems elsewhere)
- Often does not follow through on instruction and fails to finish schoolwork (starts tasks and loses focus easily)
- Often has difficulty organizing tasks and activities
- Often avoids or dislikes tasks requiring mental effort
- Often loses things
- Easily distracted
- Forgetful in daily activities

[53] W Vogel (2014) 72.
[54] BJ Sadock et al *Kaplan and Sadock's synopsis of psychiatry* (2015) 1169.
[55] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM V. 59.

Hyperactivity and impulsivity - >= 6 of the following (if 17 years or older, only 5 required):

- Often fidgets with hands or squirms in seat
- Often leaves seat
- Often runs or climbs about when inappropriate (adults have inner restlessness)
- Unable to play quietly
- Is often on-the-go or acts as if driven by a motor
- Talks excessively
- Blurts out answers before the question has been completed
- Often has difficulty waiting his/her turn
- Often interrupts or intrudes on others.

B: Several inattentive or hyperactive-impulsive symptoms were present before the age of 12 years (previously 7 years).
C: Several inattentive or hyperactive-impulsive symptoms are present in two or more settings (e.g. at home, school or work or other activities).
D: There is clear evidence that the symptoms interfere with social, academic or occupational functioning.
E: Symptoms do not occur exclusively during the course of schizophrenia or are not better explained by another mental disorder.

It is clear from the list that the behaviours described above are ones that all people engage in some of the time. The important part to take into account when diagnosing ADHD is how often and how many of the activities occur. The psychostimulants cause a decrease in these behaviours and an increase in the focus of the individual. The following questions are posed here which will be examined in later chapters:

- Whether the decrease in any of these behaviours and the resultant increase in focus attributed to the psychostimulants can be seen as cognitive enhancement.

- Given the high proportion of people that have been diagnosed with this behaviour could it not be said that these behaviours are part of the human condition and represent normative behaviour by a certain part of the population. With this in mind, it would be reasonable to say that ADHD is the medicalization of a certain part of the population to validly give them a cognitive enhancer not to enhance but rather to treat. If this is true, then society will clearly go to great lengths to make sure people do not have to consider themselves as enhancing.
- The final question follows from the previous two. If society were to make it legal to request Ritalin or Concerta for enhancement purposes what would happen to the prevalence of ADHD diagnoses?

2.7.2 Treatment of ADHD

Pharmacological treatment is considered the first-line therapy for ADHD. Psychostimulants are the first-choice agents as they have the greatest efficacy together with mild and tolerable side effects.[56] The exact mechanism of action by the stimulants in the CNS that helps the condition has not been established. Methylphenidate preparations are highly effective in up to three-quarters of children with ADHD, with relatively few adverse effects. On methylphenidate products, children with ADHD have been shown to have improved scores of tasks of vigilance, such as math calculation tests, the continuous performance task, and paired associations. Adults with ADHD have also been shown to improve on methylphenidate.[57] Modafinil has been trialled clinically in the treatment of children and adults with ADHD. One study on 248 adolescents found that 48% of those given modafinil were rated as "much" or "very much" improved compared to 17% receiving placebo.[58] However, modafinil was not approved by the FDA due to one child developing Stevens-Johnson skin rash (a severe life-threatening medical condition) while participating in the trial.[59]

[56] Idem 1175.
[57] DC Turner et al 'Neurocognitive effects of methylphenidate in adult attention-deficit/hyperactivity disorder' (2005) 178(2-3) *Psychopharmacology (Berl)* 286–95.
[58] BJ Sadock et al (2015) at 1178.
[59] SE Lindsay et al 'Use of Modafinil for the Treatment of Attention Deficit/Hyperactivity Disorder' (2006) 40 *Annals of Pharmacotherapy* 1829-33.

2.8 Use of stimulants across the world based on research

Below is a summary of some of the research into the prevalence that has been conducted around the world. This has been included to show the reader that the use of cognitive enhancers is apparent all over the world.

Iran:

- A study was conducted among 560 medical students and clinical residents of Babol University of Medical Sciences during the academic year of 2014-2015. 11% reported amphetamine and methylphenidate use. 59.2% of the users reported that the main use was to improve concentration.[60]

Israel:

- A study was conducted to assess methylphenidate usage among 229 students attending the Joyce and Irving Goldman Medical School at Ben-Gurion University in the 2013 Academic Year. 17% of the students reported using methylphenidate at least once in their lifetime.13.5% reported using methylphenidate in the past 12 months. This prevalence while it has been determined that the prevalence in Israeli students is similar to that among US medical students of 5.5-9%.[61]

Italy:

- A study conducted in 2010 which used 77 students attending a course at the Faculty of Medicine of the University of Milan, Milano, Italy. 16% of the students reported having taken cognitive enhancers in the past. Other interesting points to note in this study is that 33% of all students questioned had been advised to take cognitive enhancers while 43% said that they knew someone who took cognitive enhancers.[62]

[60] G Fallah et al 'Stimulant use in medical students and residents requires more careful attention' (2018) 9(1) *Caspian Journal of Internal Medicine* 87-91.
[61] Y Cohen et al 'Methylphenidate use among medical students at Ben-Gurion University of the Negev' (2015) 6(3) *Journal of Neuroscience Rural Practice* 320-5.
[62] S Castaldi et al 'Use of cognitive enhancement medication among northern Italian university students' (2012) 6(2) *Journal of Addiction Medicine* 112-17.

Lithuania:

- A study conducted performed in Vilnius University and Lithuanian University of Health Sciences involving 579 students found that 8.1% had used cognitive enhancers. 38.3% of the cognitive enhancers used by these students were indicated to methylphenidate, amphetamine derived drugs, or modafinil.[63]

Germany:

- A study conducted in 2009/2010 was performed using students at public grammar schools, public vocational schools, and 3 departments of the University of Mainz. The study surveyed 1035 students from the schools and 512 university students. Among all 1547 students surveyed the lifetime prevalence of non-medical use of prescription stimulants exclusively for the use of cognitive enhancement was 1.29% while the past-year prevalence was 0.26%.[64]
- A study performed in 2010/2011 in Berlin/Germany surveyed 1053 university students. The results showed that up to 2% of all surveyed students used prescription stimulants to enhance cognitive performance.[65]

USA:

- A study in a midwestern university over the assessed the prevalence of use of stimulants. This study was conducted over the years 2003, 2005, 2007, 2011, 2013. This study provides us with information regarding how stimulant medications are being used at a university. In the years studied it was found that between 2003 and 2013 lifetime medical use of stimulant medication went from 3.4% to 7.0%. While lifetime non-medical use of stimulant medication went from 8.1 to 12.7%. Unfortunately, the participants had not been asked why they were using these stimulants or specifically which stimulants they were using.[66]

[63] A Lengvenyte and R Strumila 'Use of cognitive enhancers among medical students in Lithuania' (2016) 33(2) *Nordic Studies on Alcohol and Drugs* 173-87.
[64] AG Franke 'Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany' (2011) 44(2) *Pharmacopsychiatry* 60-6.
[65] S Mache et al 'Cognitive-enhancing substance use at German universities: frequency, reasons and gender differences' *Wiener Medizinische Wochenschrift* (2012) 162 (11-12):262-271.
[66] SE McCabe et al 'Trends in medical use, diversion, and nonmedical use of prescription medications among college students from 2003 to 2013: Connecting the dots' (2014) 39(7) *Addictive Behaviors* 1176-82.

- Another study found that 85% of the US population consumes at least one caffeinated beverage per day. This again speaks to the vast use of caffeine and the fact that many people are willing to use a nootropic to increase their concentration and attention levels.[67]

Worldwide:

- The world-renowned science magazine Nature ran a poll[68] that asked questions of 1400 people from 60 countries. One in five respondents reported that they had used drugs for non-medical reasons to stimulate their focus, concentration or memory.

2.9 But do they work?

Let it not be said that the research with regards to cognitive enhancers waxes lyrical about their benefits. Some are sceptical about the effects that these drugs may have. Farah and Smith's shows that while almost two-thirds of studies of stimulant use have found an effect on cognitive processes of healthy adults, although some studies also report cognitive impairments for some users.[69] Hall and Lucke that even in the group that the drug is prescribed for, being ADHD, while they improve concentration and thereby performance in class, there is little evidence to show that they increase the marks of these students.[70]

2.10 Placebo effect

Some even question whether these drugs have any real effects or perhaps just cause a placebo effect to occur in the user. Placebo can be defined as: "a substance that has no physical effect, used when testing new drugs or given to a patient whose illness

[67] DC Mitchell et al 'Beverage Caffeine Intake in the US' (2014) 63 *Food and Chemical Toxicology* 136-42.
[68] B Maher 'Poll results: look who's doping' (2008) 452(7188) *Nature* 674-5.
[69] ME Smith and MJ Farah 'Are prescription stimulants "smart pills"? The epidemiology and cognitive neuroscience of prescription stimulant use by normal healthy individuals' (2011) 137(5) *Psychology Bulletin* 714-41.
[70] WD Hall and JC Lucke 'The enhancement use of neuropharmaceuticals: more scepticism and caution needed' (2010) 105(12) *Addiction* 2041-3.

is imaginary".[71] Furthermore, the placebo effect is defined as: "a beneficial effect produced by a placebo drug or treatment, which cannot be attributed to the properties of the placebo itself, and must therefore be due to the patient's belief in that treatment".[72] Hall and Lucke opine that cognitive neuroenhancers may benefit patients purely by the placebo effect, or by increasing perceived gains in performance.[73] Yet even if the beneficial effects are only derived from placebo effects that cause an increase in confidence or alleviating anxiety then the argument for these drugs remains. The hundreds of homoeopathic drugs that have not shown any active effect are still on the shelves of pharmacies worldwide. It is clear that merely because the effects of a substance may be due to the placebo effect does not cause them to be taken off the market nor should it.

2.11 Trough and peak of cognitive enhancers

In the early 1900s cocaine was used as a cognitive enhancer by many an academic and professional to achieve a neurological and physical increase. The increase in the use of this drug and the acknowledgement of its addictive properties led to it being labelled as an addictive substance and becoming a controlled substance such as heroin. Amphetamines were used by a vast population in the 1950s and 60s. Amphetamines are a similar molecule to methamphetamine also known as meth or crystal meth which is used for its potent euphoric effects. If society wishes to stop this occurrence from happening over and over again with increases in the use of drugs with subsequent vast regulation and decrease, then one has to be ready for the next drug with beneficial effects but severe side effects. Society has to create policies that would allow for the research of these drugs to take place in a way that would determine the methods from which the maximum benefits could be extracted from these drugs while decreasing the side effects and chances of addiction.

[71] AS Hornby (ed) *Oxford advanced learner's dictionary* (1995) 880.
[72] Placebo effect. Available at https://en.oxforddictionaries.com/definition/us/placebo_effect (Accessed on 10 July 2018).
[73] WD Hall and JC Lucke (2010) 2041-3.

2.12 Conclusion

There are three main prescription substances which are being used across the world as cognitive enhancers. These being: methylphenidate, amphetamines and modafinil. The use of these is occurring in places from the USA to South Africa. Schools and universities have seen this occurrence firsthand due to their student populations using these substances in various quantities. The effects of these drugs allow an individual mainly to concentrate and focus on the task at hand which in a schooling environment is to learn something or to do a task.

It can also be seen that these drugs have been well studied and their risk profiles, especially when used at the prescribed dose, are quite low.

This clinical chapter was not provided to make the reader an expert in cognitive enhancers but rather to explain the fundamentals of the current drugs being used as cognitive enhancers. It is the hope of the author that by giving such knowledge it will help the reader to more readily be able to picture what kind of drugs are being used. This will inform the legal and ethical aspects of nootropics in the South African context.

The research already done in South Africa shows that on university campuses methylphenidate is used as a cognitive enhancer. The prevalence of such use has been shown to be about 5 percent as can be seen in the research referred to above. In the following chapters the ethical and legal framework that is used in South Africa will be discussed to address the concerns pertaining to the use of cognitive enhancers.

This chapter has laid out the basic required knowledge needed to understand what cognitive enhancers are, how they are used and their prevalence in society. The main thread of this thesis is to understand the ethical and legal frameworks surrounding cognitive enhancers. The next chapter will start this journey by delving into the ethical and legal arguments for and against the use of nootropics in children.

Chapter 3: Cognitive enhancers and the child

3.1 Introduction

The previous chapter introduced the reader to the fundamentals of cognitive enhancers. In this chapter, the ethical and legal arguments for and against the use of cognitive enhancers in children in South Africa will be addressed.

Paediatric neuroenhancement can be defined as: "the practice of prescribing stimulant medication to enhance concentration and potentially boost academic performance in children and adolescents who do not suffer from behavioural or psychiatric disorders."[1] Children are one of the most vulnerable groups of society as they are dependent on others for their care and protection. Therefore, it is incumbent upon society to take special precautions to protect them from harm.[2]

Some believe that the growing use of cognitive enhancers among children is inevitable, acceptable[3] and even praiseworthy[4] while others believe that cognitive enhancement of children is not ethical, and clinicians should refrain from engaging in the practice.[5] Dubljević and Racine opine that when dealing with children and cognitive enhancers there are two factors to take into account: the best interests of the child and the autonomy of the child.[6] The major difference between adults and children is that adults have the autonomy to decide what is in their best interests and to act accordingly.[7] They can weigh up the benefits and risks of their choices i.e. using

[1] J Flanigan 'Adderall for all: a defense of paediatric neuroenhancement' (2013) 25 *HEC Forum* 325-44.
[2] Constitutional Court of South Africa. https://www.concourt.org.za/index.php/children-s-rights Accessed on 11/09/2019.
[3] Ibid; I Singh and KJ Kelleher 'Neuroenhancement in young people: proposal for research, policy, and clinical management' (2010) 1(1*) AJOB Neuroscience* 3-16.
[4] J Flanigan (2013) 325-44.
[5] N Gaucher et al 'Cognitive enhancement in children and adolescents: is it in their best interests?' (2013) 102(12) *Acta Paediatrica* 1118-1124.
[6] V Dubljević and E Racine 'Pediatric neuroenhancement, best Interest and autonomy: a case of normative reversal' in S Nagel (ed) *Shaping Children* (2019).
[7] The principle of autonomy states that an individual's personal preferences not be overridden in the absence of strong arguments for doing such as adults are in the best position to decide what is in their own best interests.

cognitive enhancers. However, children may not have this capacity and therefore society allows their parents or guardians to make decisions for them[8]. This privilege may be revoked if the parents or guardians are determined by the court not to be acting in the best interests of the child.[9] In this section, the different aspects mentioned above will help to examine cognitive enhancer use in children. The legal framework in South Africa that is in place to protect children, their autonomy and their best interests will also be taken into account.

It can be seen that there are sections of the Constitution[10] and legislation[11] that specifically deal with children. A Child's autonomy is protected by prescribing what they may and may not consent to and at what age and maturity[12]. This is because children may not be able to fully understand the implications of giving consent. Furthermore, they may not be able to even understand what they are consenting to, which necessarily implies that they would be unable to give informed consent. To protect children, while still allowing them to use medication or have surgical procedures, the law details who may consent for them or whether they may consent for themselves[13]. It is essential to understand who may consent for the child, when they may consent and at what age the child may consent for him or herself. This has to be taken into account when deciding if, when and how children should be allowed to consent to take cognitive enhancers.

The question could be asked as to why anyone should be concerned about children having access to cognitive enhancers? As has been seen in the clinical chapter[14], these drugs are used as the mainstay treatment for ADHD, a major childhood psychiatric disease. Therefore, they are prescribed in some places in up to 10% of the population, which is the prevalence of ADHD.[15] Furthermore, because of the ease with

[8] V Dubljević and E Racine 'Pediatric neuroenhancement, best Interest and autonomy: a case of normative reversal' in S Nagel (ed) *Pediatric neuroenhancement* (2018).
[9] McQuoid-Mason. Parental refusal of blood transfusions for minor children solely on religious grounds – the doctor's dilemma resolved. 95,1: 29-30 (2005)
[10] The Constitution of the Republic of South Africa, 1996 (hereafter the' Constitution').
[11] Children's Act 38 of 2005.
[12] Idem, s129
[13] Ibid
[14] At 2.7.2, Treatment of ADHD
[15] See section 2.7.2 Treatment of ADHD

which adolescents without ADHD can get access to cognitive enhancers in the form of stimulants, they are easily accessible as other children will offer to buy, trade or be given the stimulants from other children at their school[16]. In the USA it was found that 1 in 10 teenagers has used prescription stimulants (Ritalin/Adderall) without a prescription.[17] When more than 10% of children are using a certain type of drug it is critical to examine such a drug's use as any positive or negative effects of the drug would have a large effect.

3.2 The Constitutional prescriptions relating to children

To understand the legal viewpoint as to when a child may consent, a layered approach shall be used. This method will allow for the examination of the law from the Constitution of South Africa to the legislation, to articles that have been written on the subject. It can be seen, starting with the supreme law of the land, which is the Constitution[18], that a section is devoted to the rights of the child. The section in question is section 28 which is appropriately titled "Children". In connection with healthcare it states:

"28 (1) Every child has the right –

(c) to basic nutrition, shelter, basic health care services and social services; …".[19]

It can be seen from this that every child has the right to basic health care services in addition to the health services afforded to everyone else in society. However, because of the vulnerability of the child the section goes on to state:

[16] SE McCabe et al. The use, misuse and diversion of prescription stimulants among middle and high school students. (2004) 39 Substance Use and Misuse 1095–1116 found that 4.5% of their study sample had used stimulant medication illicitly. The study also found that of the students that reported prescription stimulant use, 23.3% reported having been approached to give, sell or trade their prescription drugs.
Musser CJ et al. Stimulant use and the potential for abuse in Wisconsin as reported by school administrators and longitudinally followed children (1998) 19 Journal of Developmental and Behavioral Pediatrics 187–192 found that 16% of the students in their cohort had been approached to give, sell or trade their prescription drugs.

[17] International Narcotics Board 'Report of the International Narcotics Control Board for 2005' (2005).

[18] The Constitution of the Republic of South Africa, 1996

[19] Idem, s 28(1)

"(2) A child's best interests are of paramount importance in every matter concerning the child".[20]

Thus, it can be seen that even when others may make decisions for the child it is paramount to take into account what is in the best interests of the child and not what may be more expedient for the parents or guardians.

Society needs to balance the child's interests: the potential cognitive-enhancing abilities of the stimulants versus the side effects of these drugs. The child cannot take all of this into account and society is thus asked to decide on behalf of the child. The question is thus: to ban cognitive enhancers for children or to allow the use of these cognitive enhancers, with the potential negative consequences such as side effects that may occur.

3.3 Who is regarded as a child?

It is important to ascertain the age until which a person is considered a child. This is explicitly set out in the Constitution in Section 28:[21]

"(3) In this section "child" means a person under the age of 18 years."

Thus, having turned to the highest law in South Africa, the Constitution, and how it pertains to the healthcare of children it can be seen that the child is someone of the age 18 or younger and that the interests of the child must take precedence. Below it will be seen how this is translated into legislation and the specific way that informed consent must be given for a child who may not have the capacity to be able to give informed consent. Before doing this, it is pertinent to look at the UN Convention of the Rights of the Child, which South Africa is a signatory of.

[20] Section 28(2) Constitution.
[21] Constitution of the Republic of South Africa, 1996. Section 28(3).

3.4 UN Convention of the rights of the child[22]

The United Nations Convention of the Rights of the Child (CRC) is a human rights treaty which sets out the civil, political, economic, social, health and cultural rights of children. It came into force on 2 September 1990. South Africa is a signatory of the Convention and therefore must create its laws concerning children in accordance with it.

Article 12 of the CRC states:

"States Parties shall assure to the child who is capable of forming their views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child".[23]

The Committee has further urged States to "review and consider allowing children to consent to certain medical treatments and interventions without the permission of a parent, caregiver, or guardian …". Mahery opines that a child's power to consent is affected by his or her ability to access a particular health care service independently.[24] If the child is not able to access the health care services by themselves then the child's right to healthcare is meaningless. She further states that allowing children to consent for themselves when they are above a certain age and level of maturity empowers them to access health services independently.

3.5 Legislation regarding informed consent for the child

The legislation dealing with children is set out in the Children's Act No 38 of 2005. Thus, it is to this piece of legislation that one must now turn.

The act specifically deals with what "the best interests of the child" refers to. In section (7) "Best interests of the child standard" it states:

[22] UN Doc. A/RES/44/25 (1989) (hereafter referred to as the 'CRC').
[23] Article 12.1 CRC.
[24] P Mahery 'Special child protective measures in the Children's Act and beyond' in T Boezaart (ed) *Child law in South Africa* 2 ed (2018) at 262.

"(1) Whenever a provision of this Act requires the best interests of the child standard to be applied, the following factors must be taken into consideration where relevant, namely –

…

(g) the child's –

(i) age, maturity and stage of development;

(ii) gender;

(iii) background; and

(iv) any other relevant characteristics of the child;

…

(l) the need to protect the child from any physical or psychological harm that may be caused by:

(i) subjecting the child to maltreatment, abuse, degradation, ill-treatment, violence or harmful behaviour towards another person;

…".[25]

It can be seen that the best interests of the child must be taken into account concerning each individual child and their specific circumstances. Furthermore, any decision taken on behalf of the child must be in the best interests of the child to protect the child from physical or psychological harm.

The Act also has a specific section which details the importance of the best interests of the child, repeating what was stated in the Constitution. S (9): "Best Interests of the Child Paramount" states:[26]

"In all matters concerning the care, protection and well-being of a child the standard that the child's best interest is of paramount importance, must be applied."

In respect of the actual consent that must be given when a child is to undergo a procedure one must look at section 129 titled 'Consent to medical treatment and surgical operation'. It states: [27]

[25] Section 7(1)(g) Children's Act.
[26] Section 9 Children's Act.
[27] Section 129 Children's Act.

1) "Subject to section 5 (2) of the Choice of Pregnancy Act, 1996 (Act No 92 of 1996), a child may be subjected to medical treatment or a surgical operation only if consent for such treatment or operation has been given in terms of either subsection (2), (3), (4), (5), (6) or (7).
2) A child may consent to his or her own medical treatment[28] or to the medical treatment of his or her child if –
   a) The child is over the age of 12 years[29]; and
   b) The child is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the treatment.[30]
3) A child may consent to the performance of a surgical operation on him or her or his or her child if –
   a) The child is over the age of 12 years; and

[28] CJ Davel and AM Skelton *Commentary on the Children's Act* (June 2018). The phrase 'treatment' is not defined in the Act but is understood to include all procedures other than those requiring surgical intervention.
[29] Mahery (2017) points out that some countries set age limits at which a child's maturity is assumed while others allow children of any age to acquire rights to consent if the child can show 'sufficient understanding' of what is being consented to. The Children's Act adopts a combined approach which has also been followed by other legislatures where age and maturity determine the capacity to consent. (R Hodgkin and P Newell Implementation Handbook for the Convention of the Rights of the Child Unicef (2007)) Hodgkin and Newell note that "the advantage of such formulas is that they avoid rigid age barriers [and] the disadvantage is that they leave judgements on when children have acquired sufficient understanding to adults, who may not respect the concept of evolving capacities'. (Hodgkin and Newell 5) Mahery goes on to state that an approach that focuses on maturity rather than age might be preferred because the combined approach appears overly protective and limits respect for the child's autonomy. A child below the age of consent is assumed to lack maturity. This limits their ability to make autonomous decisions regarding their health. Society may assume the child as immature to shield the child from making major decisions, it also stems from a general underestimation of a child's ability to participate in major health decisions. (Reynolds 'Consent and Competence in Paediatrics International Journal of Children's Rights (2007). When classifying children as immature based on arbitrary age limits restricts their autonomy. Reynolds warns that 'restricting children's autonomy unduly stunts their ability to judge and to make decisions for themselves and, therefore, hampers their development as autonomous persons.' Reynolds International Journal of Children's Rights 2007 at 504. Finally, Mahery notes that an approach that focuses on maturity rather than age would follow the likes of the Termination of Pregnancy Act and HIV provisions. This would protect immature children and promote respect and dignity of all minors who are mature enough to make decisions on treatment and surgery. Proceeding with such an approach would bring the Child Act in line with other health provisions which would streamline the process.
[30] CJ Davel and AM Skelton (June 2018) comment that this age, which may seem low was in fact dropped from the age of 14. The fact that the child needs to be both over the age of 12 and of sufficient maturity is indicated by the conjunctive use of the word 'and' between sections 2(a) and 2(b). This section specifically links the child's right to consent independently to the evolving capacity of the child. At the same time, it gives legal certainty to health professionals by providing a fixed guideline age.
Mahery in P Mahery (2017) states that the lowered age of consent has practical ramifications for children. Lawmakers have opened the door to a larger range of children being able to consent to their own treatment or surgery by reducing the age of consent. This can reduce delays or denial of health service experienced when children attempt to access healthcare without parents or their guardian and are turned away.

b) The child is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the surgical operation; and
c) The child is duly assisted by his or her parent or guardian.

4) The parent, guardian or care-giver of a child may, subject to section 31[31], consent to the medical treatment of the child if the child is –
   a) Under the age of 12 years; or
   b) Over that age but is of insufficient maturity or is unable to understand the benefits, risks and social implications of the treatment.[32]
5) The parent or guardian of a child may, subject to section 31, consent to a surgical operation on the child if the child is –
   a) Under the age of 12 years; or
   b) Over that age but is of insufficient maturity or is unable to understand the benefits, risks and social implications of the operation.
6) The superintendent of a hospital or the person in charge of the hospital in the absence of the superintendent may consent to the medical treatment of or a surgical operation on a child if –
   a) The treatment or operation is necessary to preserve the life of the child or to save the child from serious or lasting physical injury or disability; and
   b) The need for the treatment or operation is so urgent that it cannot be deferred for the purpose of obtaining consent that would otherwise have been required.
7) The Minister may consent to the medical treatment of or surgical operation on a child if the parent or guardian of the child –
   a) Unreasonably refuses to give consent or to assist the child in giving consent;
   b) Is incapable of giving consent or of assisting the child in giving consent;
   c) Cannot readily be traced; or
   d) Is deceased.
8) The Minister may consent to the medical treatment of or surgical operation on a child if the child unreasonably refuses to give consent.
9) A High Court or children's court may consent to the medical treatment of or a surgical operation on a child in all instances where another person that may give consent in terms of this section refuses or is unable to give such consent.

[31] Section 31, Children's Act 'Major decisions involving the child'.
[32] CJ Davel and AM Skelton (June 2018) state that the fact that children below the age of 12 who are of sufficient maturity are not empowered with any independent consent-giving authority should be criticised.

10) No parent, guardian or care-giver of a child may refuse to assist a child in terms of subsection (3) or withhold consent in terms of subsection (4) and (5) by reason only of religious or other beliefs, unless the parent or guardian can show that there is a medically accepted alternative choice to the medical treatment or surgical operation concerned."

As can be seen, Section 129 is lengthy and deals with many aspects of consent relating to children and thus it is important to pick it apart so that one can properly understand what the regulations require.

- Subsection 2 deals with the child consenting to his or her own medical treatment or to the treatment of his or her own child. It states that the child must both be over the age of 12 years old and that the child is of sufficient maturity to be able to make such a decision. This therefore allows for some subjectivity[33] as it allows for the medical personnel to be able to assess whether the child is of the maturity and intellectual capacity needed to be able to make what could be a life-changing decision. The child needs to be able to understand all the parts of the procedure in the same way that an adult would to give informed consent.[34]
- Subsection 3 specifically deals with a surgical operation and allows a child over 12 with sufficient maturity and mental capacity to give consent with one caveat.

[33] Mahery in P Mahery (2017) states that considering the forms that a health professional has to complete to indicate that they are satisfied that the child is mature enough to consent, it is obvious that determining maturity is a subjective task. C Himonga and A Cooke 'A Child's Autonomy with Special Reference to Reproductive Medical Decision-making in South African law: Mere Illusion or Real Autonomy?' (2007) 15(3) *IJCR* 323-363 at 354–5 have questioned the capacity of health professionals to even determine maturity. They describe some of the problems with health professionals determining capacity:

- Determining capacity of the child requires considerable consultation time, which is usually not available especially in public healthcare.
- Medical professionals have a lack of skill and expertise in child development which is required to ascertain capacity.
- Some medical practitioners hold the view that capacity is a legal construct and therefore it is not for them to determine capacity.
- The absence of guidelines for medical professionals on how maturity should be judged probably leads to varied subjective treatment of children.

[34] Mahery in P Mahery (2017) states that the inclusion of a maturity assessment (the maturity test), which was not part of the Child Care Act, to determine a child's capacity to consent is an improvement on the age-based approach used in the Child Care Act. The Committee of the Rights of the Child, General Comment 12 para 30 stated that maturity refers to: "the ability to understand and assess the implications of a particular matter". The problem is that there is no standardised test to determine maturity.

The child must be assisted in giving this informed consent by his parent or guardian.

- Subsection 4 states that if the child needs medical treatment then the guardian, parent or caregiver has the power to give consent on behalf of the child if the child is younger than 12 years old or is over 12 years old but does not maturity or is unable to understand the benefits, risks and implications of the treatment. One must note that this should only be done after listening and taking in to account any views expressed by the child.
- Subsection 5 states the same as section 5 but deals with a surgical operation.
- Subsection 6 deals with an emergency which is life-threatening or may leave the child with a permanent injury. In such cases, this subsection gives the superintendent of the hospital or the person in charge the power to give consent for a medical or surgical procedure for the child without first having to try obtaining the consent of the legal guardian of the child.
- Subsection 7 gives the Minister the power to give consent for the child to undergo a medical or surgical procedure when the child's legal guardian unreasonably refuses to give such consent or refuses to give consent altogether, the guardian is unable to give consent (due to not having the capacity to give consent due to for example a mental disorder), cannot be traced or is deceased.
- Subsection 8 gives the Minister the power to give consent for the child to undergo a medical procedure or surgical procedure if the child unreasonably refuses to give consent. This is only with respect to subsections 2 or 3 where the child would be over 12 years old and thus would be able to give consent for him or herself.
- Subsection 9 refers to the case where anyone who has the power to give consent for the child to undergo a medical or surgical operation unreasonably refuses to do so and empowers the High Court or a Children's court to override the decision and give consent.
- Subsection 10 makes it illegal for a legal guardian to refuse to give consent for a procedure to be done on the child if the only reason for the refusal is religious or some such other belief unless the guardian can show that there is a medically accepted alternative procedure that can be done.

It can be seen from the above subsections that even in cases where the child has the power to give consent, they do not ultimately have the final say in the matter. This is because if any of their decisions are objectively viewed as flawed then the medical personnel can have the legal guardian, or if the guardian does not consent, have the courts overrule the child's and the guardian's decision. This is because of section 9 of the Act which must always be taken into account and takes the child's health to be of the utmost importance, even allowing for the overriding of the legal guardian's wishes.

In South African law, the health and safety of the child is of critical import. From the above sections, it can be seen that the parents of the child are given the task of protecting the child. They must decide for the child what medications and procedures may or may not be needed and give informed consent for such. However, it must be noted that because the child's health is viewed with such importance, if the parents attempt to make a decision that could endanger the child, the medical practitioner may approach the courts to override the parents' decision.[35]

3.6 Discretionary use of methylphenidate by adolescents

Children are the major users of methylphenidate. Doctors prescribe methylphenidate to children whereby the child is to take the drug every day without fail.[36] However, it has been found that children find that the drug's side effects prohibit them from being authentic in social situations. It has been shown that it affects the child's demeanour, mood and even preferences.[37]

The concept of children using cognitive enhancers at their discretion is not new. A study has been done in Israel whereby 38 children had been diagnosed with ADHD and were on or had taken methylphenidate.[38] The study found that participants, aware

[35] McQuoid-Mason D Parental refusal of blood transfusions for minor children solely on religious grounds – the doctors dilemma resolved (2005) 95(1) South African Medical Journal 29-30
[36] Drugs.com Ritalin dosage. https://www.drugs.com/dosage/ritalin.html Accessed on 23/09/2019
[37] A Fleishmann and A Kaliski 'Personal autonomy and authenticity: adolescents' discretionary use of methylphenidate' (2017) 10(3) *Neuroethics* 419-30.
[38] Ibid

of the specific effects and side effects of cognitive enhancers applied discretion in taking methylphenidate so they could make maximum benefit of the effects.[39] For example, when studying for an exam these students took methylphenidate; when they need to be creative or sociable, they avoid it and take advantage of their ADHD qualities; creativity and spontaneity.[40] This study gives credence to allowing children to determine their own usage of cognitive enhancers. From the study, adolescents diagnosed with ADHD could manage their prescriptions preferably with their parents' help. One may extrapolate that since adolescents with ADHD can manage their medication then adolescents without ADHD would be able to manage their use of cognitive enhancers as well.

Societies perception of pharmaceutical agents as mere drugs that act on the brain in a certain way needs to change. When looking at technology such as laptops and phones, a person sees machinery that can help to better their lives. A tool that can help that person be more productive. The same approach could be taken with cognitive enhancers. Some drugs can help people to concentrate for longer while others may increase retention of information. Furthermore, cognitive enhancers could eventually be created that have effects on other cognitive abilities. These pharmaceuticals should be viewed as tools that can be used to better people's lives as well.

3.7 Coercion of the child and the child's right to refuse

This chapter focuses on why the child should be allowed to use cognitive enhancers if he or she so wishes. However, the case for the reverse is equally as important. If a child does not wish to use cognitive enhancers, then what should occur. It is important to protect this vulnerable group from being forced by their parents or guardians to use cognitive enhancers. In societies where cognitive enhancement use is becoming more prevalent the temptation to coerce children to use cognitive enhancers even against

[39] Ibid
[40] Ibid

their will must be prevented. The need to protect these children from coercion becomes crucial.[41]

The legislation in South Africa would allow any adolescent greater than 12 years old and of sound mind and maturity to refuse to take cognitive enhancers.[42] The issue of coercion would be more important for children under 12. They do not have full decision-making capacity and may not understand the risks and benefits involved in neuroenhancement. These children may be subjected to pressures that come from family, friends, as well as personal and community environments. To protect the rights of children and adolescents that choose not to use neuroenhancers, doctors should be required to discourage all forms of direct and indirect coercion.[43] The autonomy of a child to use a cognitive enhancer has as its flip side as to why children should be allowed to refuse such use. The case is further strengthened in that there is no conclusive proof that such use will definitively improve the child's success in future endeavours.[44] Without such proof, it is inconceivable to treat cognitive enhancers as a vaccine against low academic performance and allow their forced use on children who refuse them.

If a doctor is faced with a case such as this then the principle of beneficence should come to the fore. Within beneficence, the principle of passive paternalism would be used here. This refers to a doctor who refuses to perform an intervention or provide treatment for reasons of patient-centred beneficence.[45] In the case where people wish to coerce children to take cognitive enhancers, the doctor should refuse to do so due to the principle of beneficence and his duty to prevent harm occurring to the patient.

---

[41] HT Greely et al 'Towards responsible use of cognitive-enhancing drugs by the healthy' (2008) 456(7223) *Nature* 702-5.

[42] Children's Act 38 of 2005, Section 129(8) states that the Minister of Health may only override a refusal by a child of 12 years of age if it is deemed unreasonable. Since the use of cognitive enhancers is not a life-saving measure and given the uncertainty of cognitive enhancers' effects, the Minister would not find any support in the courts as to deem a child's decision to refuse cognitive enhancers as unreasonable.

[43] WD Graf et al 'Pediatric Neuroenhancement: ethical, legal, social, and neurodevelopmental implications' (2013) 80(13) *Neurology* 1251-60.

[44] The case is strengthened further with some studies unable to find any evidence that the use of cognitive enhancers such as Ritalin has any beneficial effects on school performance. See van der Schans J et al. Methylphenidate use and school performance among primary school children: a descriptive study (2017) 17 BMC Psychiatry 116.

[45] K Moodley (ed) *Medical ethics, law and human rights: a South African perspective* (2010) at 60.

3.8 Analogous cases of informed consent

It is critical to descend into the particular and attempt to find analogous cases where medicine is used not for health benefits but rather to augment form or function of the human body. Two cases, that of plastic surgery and contraceptive pills are set out below.

3.8.1 Plastic surgery

Plastic surgery can be defined as:[46] "The process of reconstructing or repairing parts of the body by the transfer of tissue, either in the treatment of injury or for cosmetic reasons". Herein the use of plastic surgery for cosmetic reasons will be considered. Such use could be to remove fat, enhance breast appearance or change the shape of one's nose. These operations are not done for a medical reason but rather because the patient wants to have the results – better appearance to oneself and others. In this aspect it is known as an elective procedure i.e. it is done based on the patient's wants in the same way that using cognitive enhancers are based on the patient's wants.[47] Plastic surgery in adults is a well-known form of enhancement that is touched upon in another chapter. Here it will be considered as to whether a minor would be able to consent to such an operation. The legislation governing such in a child states:[48]

3) A child may consent to the performance of a surgical operation on him or her or his or her child if –

a) The child is over the age of 12 years; and
b) The child is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the surgical operation; and
c) The child is duly assisted by his or her parent or guardian.

Here it can be seen that if it was only criteria mapped out in subsection 3 (a) and (b) then the child would have been able to give informed consent for the operation by him or herself. (c) comes along and the exact meaning of being assisted seems to be a bit

[46] Plastic surgery. Oxford Online Dictionary https://en.oxforddictionaries.com/definition/plastic_surgery Accessed 10 February 2019.
[47] N Bostrom and A Sandberg 'Cognitive enhancement: methods, ethics, regulatory challenges' (2009) 15(3) *Science and Engineering Ethics* 311-41.
[48] Section 129(3) Children's Act.

vague. “Assist” could mean that the parents must give the final informed consent or could mean that they should help the child come to a decision. On the other hand, there is the case of contraceptive pills.

3.8.2 Contraceptive pills

Contraceptive pills are used to prevent a female from falling pregnant. By doing this the female can have intercourse after which she does not need to worry about any implications concerning becoming pregnant. This is a case of a pharmaceutical that is not used for any health benefit. They are not needed by the majority of those who take them. The benefit could be achieved in other ways, such as by using condoms or abstaining from sex. However, certain children, like other contraceptive users, may have good reasons or just prefer oral contraceptives to the alternatives. It can be seen that parental permission for contraception use should not be required as this would violate the patient’s privacy and parents may disagree with their adolescents’ choices.[49] The choice ultimately falls on the child who is in control of their body and must decide with the help of the doctor.

Legally, allowing adolescents to use contraceptives can be seen as an extension of the adolescent’s right to decide their own sexual affairs. The law in South Africa is in line with this opinion. Section 134 of the Children’s Act states:[50]

‘Access to contraceptives –

(1) No person may refuse

1. (a) to sell condoms to a child over the age of 12 years; or
2. (b) to provide a child over the age of 12 years with condoms on request where such condoms are provided or distributed free of charge.

(2) Contraceptives other than condoms may be provided to a child on request by the child and without the consent of the parent or caregiver of the child if—

1. (a) the child is at least 12 years of age;

[49] DL Helitzer et al ‘The “ins” and “outs” of provider-parent communication: perspectives from adolescent primary care providers on challenges to forging alliances to reduce adolescent risk’ (2011) 48(4) *Journal of Adolescent Health* 404-9; LK Perreira and M Greenfield ‘When parents do not want their daughters on birth control pills: Tips for navigating a difficult clinical situation’ (2012) 25 *Journal of Paediatric and Adolescent Gynaecology* 79-81.

[50] Section 134 Children’s Act.

2. (b) proper medical advice is given to the child; and
3. (c) a medical examination is carried out on the child to determine whether there are any medical reasons why a specific contraceptive should not be provided to the child.

(3) A child who obtains condoms, contraceptives or contraceptive advice in terms of this Act is entitled to confidentiality in this respect, subject to section 110'.

It can be seen that an adolescent may obtain prescription medication. I.e. contraceptive pills from the age of 12 as long as proper medical advice and a medical examination are performed.

Herein lies a potential solution to allowing children above the age of 12 the right to exercise their autonomy when it comes to cognitive enhancers. The child would be able to go to a doctor and request cognitive enhancers. After medical advice and a medical examination are given the adolescent may be given a prescription for such.

3.9 The Child, Education and Cognitive enhancers

The right to education is an important one. The Constitution in section 29 states:

(1) Everyone has the right –

(a) to a basic education, including adult basic education; and

(b) to further education, which the state, through reasonable measures, must make progressively available and accessible.

This right applies to children in that every child must go to school[51] and has the right to go to school. If the child is not able to study or gain a basic education because of a lack of facilities or overcrowding, then the state has failed to uphold the right of the child. Could the use of cognitive enhancers allow the state to better fulfil their responsibility? Such will be argued for in this chapter.

[51] South African Schools Act 84 of 1996, s3(1) Learners: Compulsory Attendance, states: "… every parent must cause every learner for whom he or she is responsible to attend a school from the first school day of the year in which such learner reaches the age of seven years until the last school day of the year on which the learner reaches the age of fifteen years or the ninth grade, whichever occurs first."

3.10 Enhancing while at school: Is it cheating?

At universities, cheating is viewed very seriously. A person who has cheated may be subject to a disciplinary enquiry which may result in expulsion from the university[52]. To determine if the use of pharmaceutical cognitive enhancers is indeed cheating requires an analysis of what "cheating" is and a determination of whether it applies to the use of pharmaceutical cognitive enhancers.

Cheating can be defined as: (v) to trick or deceive sb/sth: [Vn] *The employees feel cheated by their low pay rise, cheat the taxman, cheat death*. (at sth) to act dishonestly or unfairly to win an advantage, especially in a game or an examination.
A cheat can be defined as: a person who cheats, esp. in a game: *you little cheat!*, *a dishonest trick*.[53]

Cheating as applied to examinations usually involves a student either having study material at their disposal during the exam, looking at another student's answer paper during the exam and copying off such, or have gained access to the question paper before the exam to learn the exact answers that are required. It can be seen that all of these mechanisms of cheating require the student to actively obtain information about the exam before others or to copy off another's work or study material during the exam. Using cognitive enhancers can be seen to be a completely different method to obtain better results as opposed to cheating. By taking a cognitive enhancer the student does not acquire information automatically as if by osmosis[54]. Effort and study need to be put in to learn the work. The cognitive enhancers do not perform the studying for the person in the same manner that the extra lessons tutor does not do so for the student. They merely facilitate it. The enhanced student must still study, deploy intellectual effort, write their assignments and sit their tests.[55] Will the student find it easier to study or be able to study longer or to retain more? Of course, this is the point of

[52] University of Pretoria 2019 Rules and Regulations https://www.up.ac.za/yearbooks/2019/rules-pdf
[53] J Crowther (ed) *Oxford advanced learner's dictionary* (2005) at 189.
[54] This is used colloquially usually by a sarcastic professor in a university class to underline the fact that information will not merely be absorbed without studying.
[55] F Santoni de Sio et al 'Why less praise for enhanced performance?' in F Jotterand and F Dubljievic (eds) *Cognitive enhancement: ethical and policy implications in international perspectives* (2016); MJ Mehlman 'Cognition-enhancing drugs' (2004) 82(3) *Milibank Quarterly* 483-506.

cognitive enhancers. However, there is no bypassing the actual process of having to study the work being taught and having to use one's knowledge to answer the questions that appear in the exam paper.

Caffeine is used by students in all its forms before and during exams, i.e. coffee, tea, chocolate and various other products are consumed by most students present at universities around the world. Yet this does not cause the ethical and legal ramifications of such use to be assessed[56]. Using the newer pharmacological drugs that are considered in this thesis has resulted in arguments over how unethical such practice is. Society has found caffeine to be morally acceptable and socially acceptable yet when it comes to these new drugs such acceptance has not as yet been found. If there is to ban on cognitive enhancers at learning institutions it would seem fairer to have the ban affect all pharmaceutical cognitive enhancers including caffeine. If it is unethical to allow students to use drugs to help them study, then no drugs should be allowed.

Cheating also involves acting dishonestly[57]. In this instance, one could make students fill out a register before the exam to declare any cognitive enhancers that they may have used to help them study. Again, this seems arbitrary. Schools and universities should then also ask students to declare if they have had tutors that helped them, the kind of computers they have access to, their internet speed as well as the extra books they might have read up on. Such a registry could be a gold mine for a study on how children learn but it would infringe on the student's privacy while creating no difference to the outcome of the child writing the exam.

Another way to determine whether cognitive enhancers should be viewed as cheating is to look at what the aim of schooling is. If school is merely a competition for grades, then cognitive enhancers would be viewed as cheating if they were not available to everyone or against the official rules of schooling. However, if school primarily fulfils a

[56] In a recent study involving 1248 from different USA universities found that 91.7% of them used caffeine in some form. CR Mahoney et al. Intake of caffeine from all sources and reasons for use by college students. (2019) 38 *Clinical Nutrition* 668-675.
[57] J Crowther (2005).

social function then the use of cognitive enhancers may be irrelevant to the function. Lastly, if the aim of schooling is the acquisition of information and the pursuit of knowledge then cognitive enhancers would have a role to play in furthering this goal.[58]

There also appears to be an ethical and legal disconnect between the external and internal technology used in enhancing. This can be illustrated with an example from the sport of running. Erythropoietin is a pharmaceutical drug that is used by athletes to increase their performance[59]. In sports, erythropoietin has been banned from use in athletes due to its performance-enhancing abilities[60]. On the other hand, most runners wear running shoes when they run. Running shoes help athletes to run without injuring their feet from debris on the road while also helping to support the weight placed on their feet. However, shoes have now been designed to not only support and protect the runner's feet but to help the runner go faster as well. This has all but been proven in the fact that in 2017 Nike attempted to break the marathon two-hour barrier by using new shoes that they had developed.[61] The shoes did allow the runners to go faster and research has shown that the shoes, which are still being sold openly, cause runners to run 4% faster on average.[62,63] It can be seen that while society is quick to ban a pharmacological substance that may cause performance enhancement, such measures are not enforced as regularly on external technology that also enhances performance.

In summary, it is pertinent to note that the pharmaceutical agents still require the athletes or students to put in work to achieve the desired result[64]. Merely taking these agents does not cause instant performance increases but rather allows for the effort

[58] N Bostrom and A Sandberg 'Cognitive enhancement: methods, ethics, regulatory challenges 15: (2009) *Science and Engineering Ethics* 311

[59] DW Haile et al 'Effects of EPO on blood parameters and running performance in Kenyan athletes' 51(2): (2019): 299-307 *Medicine and Science in Sport and Exercise* 303

[60] World anti-doping agency 2019 list of prohibited substances and methods https://www.wada-ama.org/en/content/what-is-prohibited

[61] Nike 'Breaking 2' Available at: https://www.nike.com/za/en_gb/c/running/breaking2 (accessed on 3 June 2018).

[62] J Katz and K Quealy 'Nike says its $250 running shoes will make you run much faster. What if that's actually true?' https://www.nytimes.com/interactive/2018/07/18/upshot/nike-vaporfly-shoe-strava.html Accessed on 27 July 2018.

[63] W Hoogkamer et al 'A Comparison of the Energetic Cost of Running in Marathon Racing Shoes' 48(4): (2018) Sports Medicine 1017

[64] MJ Mehlman, 'Cognition-enhancing drugs' 82(3): (2004) *Milibank Quarterly* 483

put in to be maximized. There also appears to be a difference in societies' thinking when it comes to performance-enhancing based on external technologies versus substances that are ingested. It can thus be seen that the blanket argument that cognitive enhancers are unethical because they are equivalent to cheating fails to stand up to scrutiny.

3.11 Distributive Justice

South Africa is one of the world's most unequal countries when it comes to resources available to people.[65] It is thus important to discuss distributive justice concerns, which deals with the distribution of resources in a fair manner[66]. Why should it be that a person that can afford cognitive enhancers be allowed to obtain them and thus afford an unfair advantage while those that cannot afford them fall even further behind? This follows the argument that by using these drugs the rich will create an ever-higher gap between themselves and the poor[67]. The American Academy of Neurology has recommended against cognitive enhancement partially because a fair distribution of neuro-enhancing drugs would be difficult to achieve and contentious.[68]

This argument however is highly unconvincing. The world is full of inequalities, many of which relate to technologies that the rich can afford while the poor cannot. As with most technologies, what is new today will be available at a price that even the poor can afford in five years. Technology progresses at a pace that ends throws off benefits not only to the richest but to the poorest too. Today in South Africa it is common to see a beggar taking out a cellphone with a colour touchscreen. Yet, not even the richest person in the world could have paid for such technology twenty years ago.

It can be argued that the same case can be made for the ethical use of cognitive enhancers in school. It is far from obvious that only those that can afford these drugs

[65] The World Bank in South Africa. https://www.worldbank.org/en/country/southafrica/overview Accessed on 10/10/2019. Updated on 28/03/2019.
[66] K Moodley (ed) (2010) 74.
[67] N Bostrom and A Sandberg (2009) 329
[68] WD Graf et al (2013) 1251-60.

would be able to use them and get the benefit from that use.[69] If these drugs are initially expensive then by allowing these drugs to be readily be sold would allow market forces to act. As new generations of cognitive enhancers become available and patents expire on the older ones these drugs will be sold for less thus allowing cheaper access to them for the poorer students[70]. If the substances are found to be highly beneficial then access to such might become a societal obligation in the same way that basic education and public libraries are[71]. But even if this never becomes the case the fact that something presents an inequality does not necessarily make it unethical. Schooling provides a formalized system of education for our children. The goal is to give children the basic knowledge to allow them to flourish and participate in society in whatever direction they wish to follow after school. Ultimately then schooling provides a platform for children to attain the knowledge to become contributing members of society. Cognitive enhancers allow for the increase in retention of information. Other cognitive enhancers that may be discovered could allow for quicker understanding and processing of knowledge thus leading to a faster pace of work being done and potentially breakthroughs being made in different fields. These discoveries would lead to an exponential rise in further discoveries being made. One could look at this cycle as a zero-sum game with winners and losers. Winners being the ones who make the discoveries and get rich, losers being everyone else. However, this attitude is short-sighted. It can be seen that these discoveries would bring economic externalities that would benefit all of society[72].

If a child is having problems focusing due to their environment society have a moral imperative to either change the environment or help the child concentrate in such an environment. Doctors are already prescribing Adderall and Ritalin to children for this

[69] In South Africa, the public primary healthcare system is free for the poor and provides Ritalin and Concerta to those children who have ADHD.
[70] N Bostrom and A Sandberg (2009) 329
[71] J Hughes Citizen (2004) *Cyborg: Why democratic societies must respond to the redesigned human of the future* Boulder: Westview Press.

[72] N Bostrom and A Sandberg (2009) 328

reason[73]. By allowing a child in such conditions to have access to cognitive enhancers the child can focus and achieve marks that would be equivalent had the environment been optimum. This can be seen from studies that show that not all children that are put onto ADHD medication fit the criteria. A study of ADHD prevalence among a sample of 10,427 children found that only 28.3-39.5% of children who were medicated met the diagnostic criteria for the disorder.[74] Thus doctors are not only medicating children due to that child meeting the diagnostic criteria for a disorder.

It can be seen that whether cognitive enhancers are cheap or expensive should not determine whether they may be used by society. The fact that something is expensive and will not be available by all (i.e. private schools) does not necessarily make it unethical to use. Rather by allowing market forces to play out may lead to cognitive enhancers being cheap enough for the poorest to afford. Furthermore, if cognitive enhancers are found to truly confer a substantial benefit then the universal use of such could become a basic necessity such as basic education and primary healthcare.[75]

3.12 Disability and disadvantage

To illustrate the difference between a child who has a disability (ADHD) and one that is disadvantaged (economically) requires the presentation of two cases illustrating the difference:[76]

ADHD Sipho is a 13-year-old child who lives in Sandton. His dad is the CEO of a top JSE listed company. Sipho goes to one of the most prestigious schools in South Africa. He also has tutors that help him with his homework and make sure that he understands every concept that comes his way. He has a stay at home mom who looks after his every need. However, Sipho has still been struggling at school and his teachers suspect that he has ADHD because he fidgets a lot and can't concentrate. Sipho's

[73] A Schwarz *Attention Disorder or Not, Pills to Help in School* New York Times 9 October 2012 https://www.nytimes.com/2012/10/09/health/attention-disorder-or-not-children-prescribed-pills-to-help-in-school.html

[74] Centre for Disease Control and Prevention 'Project to learn about ADHD in youth (PLAY) study findings' (2012).

[75] s 27(1)a and s 29 The Constitution, 1996

[76] This example was inspired by J Flanigan 'Adderall for all: a defense of paediatric neuroenhancement' (2013) 25 *HEC Forum* 325-344

parents take him to one of the best paediatricians in the country who diagnoses him with ADHD and puts him on Ritalin. Once Sipho is on Ritalin his grades improve and he now finds school enjoyable.

Neuroenhancement Sarah is a 12-year-old girl who lives in Soweto with her mother and her 4 siblings. They live in a small house and she shares a bed with her other siblings. Sarah's Mom has to work two jobs to provide for the family and is hardly at home during the week. Sarah's grandmother comes to look after the children when the Mom is working. Sarah goes to a school with forty children in each class and no computers. She has been struggling because she has to deal with the constant noise and distractions at home and at school due to the overcrowding in both places. Sarah does not have ADHD but a doctor at the local clinic who sees her when she has a cold and took an interest in her situation has prescribed her Ritalin. The doctor explained the risks and benefits after which Sarah gave her consent to start taking Ritalin. She now gets much less distracted at home and school and can get through her work without problems. Her teachers comment about her progress as a model student.

Notice above how the two students have problems. Both of these children could be said to be disadvantaged in ways that affect their academic performance. The one is disadvantaged due to medical factors (ADHD) while the other is disadvantaged due to economic factors (low socio-economic status). Yet the one, even though he has all the facilities at his disposal is considered to have a disease/disability and therefore put on Ritalin without fuss. This is what the guidelines for someone who has ADHD clearly say that he should be given.[77] Yet a person who is disadvantaged and cannot change their circumstances is to be denied such stimulants as it is then classified as cognitive enhancing. It would be more ethical from both a beneficence and justice point of view to help Sarah to overcome her disadvantages by taking such drugs. Sarah faces nonmedical disadvantages yet a medical solution like Ritalin may still be effective. The prescription of a medical solution is discouraged, however, even if this type of treatment would be effective in both cases and even if patients like Sarah struggle more on average than patients like Sipho. ADHD is classified as a disability because

[77] AJ Flisher and S Hawkridge 'Attention deficit hyperactivity disorder in children and adolescents' (2013) 19(3) *South African Journal of Psychiatry* 136-40.

it impairs children's ability to succeed in the school environment. A distracting and understaffed environment can have the same effect on a child. Surely, each child should be able to choose as to what form of help they need. Some children may choose an extra tutor if their parents can afford one while others may choose medication. As long as the child understands the pros and cons of each medication or external helping agent, the adolescent should be able to choose what is right for them[78].

The legislation guiding a child with a disability or chronic illness should be looked at on this point.

Section 11 of the Children's Act: Children with Disability or Chronic Illness states:

1. In any matter concerning a child with a disability[79] due consideration must be given to:

    (a)…

    (b)…

    (c) providing the child with conditions that ensure dignity, promote self-reliance and facilitate active participation in the community.

    (d)…

2. In any matter concerning a child with chronic illness[80] due consideration must be given to:

    (a)…

    (b) providing the child with conditions that ensure dignity, promote self-reliance and facilitate active participation in the community

    (c)…

It can be seen from each of these provisions in the legislation that providing a child with the conditions to facilitate his or her flourishing in the committee is of import. Yet

[78] J Flanigan (2013).

[79] A 'disability' is defined in UNICEF (2009) *The Children's Act Explained – Booklet 1: Children and parents – rights and responsibilities* 36 as: "a condition either physical or mental (of the body or the mind) where someone is unable to function in a normal way due to a lack of ability, power, or fitness to do a certain action."

[80] Defined ibid as: "an illness (sickness) or condition that will last a long time (usually longer than three months). Sometimes there is no cure for a chronic illness (for example HIV/AIDS). Examples of chronic illnesses or conditions are high blood pressure, diabetes, asthma and tuberculosis."

again the disadvantaged child can be seen to have a disability caused by economic circumstances. They cannot flourish due to economic reasons rather than medical reasons and therefore a medical solution is looked down upon. If a medical solution could help a disability or disadvantage, then a medical solution should not be withheld due to the cause of the disability. It is interesting to note that the definition of a chronic illness[81] states that it is a condition that will last a long time. Being disadvantaged is such a condition yet because it is not medical in nature it is not viewed as necessitating a medical solution.

The idea that ADHD does have a larger biological basis than failing schools is a given. However, is society to limit medication to a child based on whether something is biological or environmental in cause? There is no definitive test for ADHD and therefore on some level, the diagnosis is subjective.[82] Its prevalence is influenced by a person's home and learning environment.[83] The traditional lines between medical and nonmedical conditions and between treatment and enhancement are blurring further all the time. The psychiatry diagnostic manual which was referred to previously in the clinical chapter[84] specifically states that it is a book with descriptive parts for each psychiatric illness. It is doubtful that total biologic causes will ever be found for psychiatric diseases and thus there is a need to understand that illness is caused by internal aspects such as genetics as well as external aspects such as the environment. The biopsychosocial model used by most medical professionals clearly illustrates this. It attempts to take into account the biological, psychological and social aspects of the patient and bring them together to find a solution to the problem affecting the patient.

Surely with this breakdown between medical and nonmedical causes of disease will also allow for the breakdown between treatment and enhancement. Paediatricians should be using this model to ascertain a clinical picture of the child and to attempt to

[81] Ibid.
[82] In diagnosing ADHD, the guidelines state that the diagnosis should be made on clinical interviews with parents, caregivers and patient. Rating scales to assess the necessary symptoms of the disorder must be used such as the Diagnostic Interview Schedule for Children (DISC-IV) or the Conner's Parent Rating Scale - Revised (CPRS-R) and the Conner's Teacher Rating Scale - Revised (CTRS-R).
[83] SA Hart et al 'Exploring how ADHD symptoms are related to reading and mathematics performance: general genes, general environments' (2010) 21 *Psychological Science* 1708-15.
[84] Chapter 2

understand the child as a whole. If a paediatric patient can benefit from a stimulant, then the job of the doctor is to provide access to one. Doctors are there to help the patient decide if based on the pros and cons a certain medication is right for them. Taking these into account it could be seen that in some patients with ADHD, stimulants would be inappropriate because of severe side effects and appropriate for others without ADHD because they suffer from failing schools or other circumstances that constitute a significant disadvantage. As Flanigan rightly puts it[85]:

[T]he decision to prescribe stimulants should not be informed by asking, "Can this medication treat a particular medical condition?" but rather, "Can medication make the patient's life better on balance?"[86]

3.13 Cognitive enhancers as emotional boosters

In school, there are subjects which some children will enjoy and others that they will not. Teachers try to present the material that they wish to impart onto the child in such a way so that the child is interested in the subject matter. A person is more likely to put in the work and the effort to do well in a subject that he or she is interested in. Research shows that psychostimulants may exert their effect by making the subject matter more interesting.[87] Surely if a child is prescribed material to learn all the better if it can be made to seem more interesting. This brings to the for the question of mind control. Would society not merely be brain-washing these children into making them like the work placed before them? Firstly, it should be pointed out that these drugs seem to exhibit their effects without any bias i.e. they do not cause the child to favour mathematics more than literature. Secondly, if the child as an autonomous being wants to increase his or her interest but cannot do so internally via mental effort then surely if there is a drug that can help them to achieve the same effect, such drug should be available for the student to acquire if so wished.

[85] J Flanigan (2013) 325-44.
[86] Ibid at 331.
[87] S Vrecko 'Just how cognitive is cognitive enhancement? on the significance of emotions in university students experiences with study drugs' (2013) 4(1) *American Journal of Bioethics (AJOB) Neuroscience* 4-12.

These same drugs have also been found to increase the sense of accomplishment that the child feels[88]. It should be obvious that if a student feels that they are accomplishing something then they are more likely to carry on with whatever it is they are doing. If a child works for 5 hours at something and makes no progress, no doubt carrying on would probably feel hopeless. However, if after 5 hours that child felt that the work she was getting somewhere then she would be much more likely to carry on. How much more could one accomplish by putting in the extra hours to get through a difficult problem? Again, if this is accomplished by a drug rather than mental effort then surely as long as an autonomous being wants the drugs they should be made available. Vrecko reports in his research that users sometimes acknowledged that stimulants did not improve their cognitive abilities but that they believed the drugs to be beneficial because of the emotional and behavioural effects[89].

An emotional or behavioural benefit is still mediated by the brain and in this sense, the drugs that have been discussed in this thesis can be shown to enhance these cognitive aspects which may not usually be seen as cognitive in nature.

3.14 Autonomous children (Children > 12 years)

Adults in the majority are viewed as autonomous beings. However, the same is not true for children. At what age should society view them as autonomous beings that have the right to make their own decisions about what they wish to put into their bodies. If some children wish to take cognitive enhancers, then when should they be viewed as having the capacity to make such a decision. It can be seen that children have a forceful claim to access neuro-enhancing drugs because in many cases they are capable of informed consent. If one looks at the South African law, it can be seen that herein the interface between ethics and the law matches. The Children's Act, Section 129 states:

[88] Ibid.
[89] Ibid.

(11)A child may consent to his or her own medical treatment or to the medical treatment of his or her child if –

d) The child is over the age of 12 years[90]; and
e) The child is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the treatment.

Certainly, there are still those who question a child's capacity to give informed consent at such a young age due to the concerns over whether they can accurately perceive the benefits, risks, and implications of the treatment. However, many have suggested that mature children should be considered medically autonomous.[91] In South African law, a child over 12 years of age and of sufficient maturity and capacity is allowed to make their own decisions. Mature children can understand the risks and benefits of a treatment decision as well as adults. In many families and societies, minors can care for younger children as babysitters. In adolescence, as cognitive abilities and mature judgements develop, doctors are compelled to give due weight to the preferences of adolescents with mature decision-making capacity.[92]

The responsibilities placed onto adolescents clearly show that they are expected to behave and understand consequences as adults do. Thus, it would be unjustifiable to not allow them to have the same rights other medically competent people possess.[93] If all these reasons are considered together with the fact that legally children above 12 possess the right of informed consent in South African law it is clear that children above 12 are capable of giving informed consent except in certain conditions. A

[90] In s 39(4)(b) of the now-repealed Child Care Act 74 of 1983 a child aged 14 and older was allowed to consent to his or her own medical treatment without parental or guardian assistance. Section 39(4)(a) of that Act allowed for a child to consent to his or her own surgery without parental consent only at the age of 18. The Children's Act has now reduced both age restrictions to 12 years.

[91] American Academy of Pediatrics Committee on Bioethics 'Informed consent, parental permission, and assent in pediatric practice' (1995) 95(2) *Pediatrics* 314-17; T Grisso and L Vierling 'Minor's consent to treatment: a developmental perspective' (1978) 9(3) Professional Psychology 9(3) 412-27; S Leikin 'A proposal concerning decisions to forgo life-sustaining treatment for young people' (1989) 115(1) *Journal of Pediatrics* 17-22; LA Weithorn and SB Campbell 'The competency of children and adolescents to make informed treatment decisions' (1982) 53(6) *Child Development* 1589-98.

[92] American Academy of Paediatrics Committee on Bioethics (1995) 314-17; ED Berlan and T Bravendar 'Confidentiality, consent, and caring for the adolescent population' (2009) 21(4) *Current Opinion in Paediatrics* 450-6.

[93] G Koren et al 'Maturity of children to consent to medical research: The babysitter test' (1993) 19(3) *Journal of Medical Ethics* 142-7.

condition is if it is deemed that the child has unreasonably refused to give consent. The Minister of Health or someone acting on his behalf may then override the adolescent's decision.[94] Due to these ethical and legal positions for many kinds of medical decisions teenager's rights to informed consent are generally accepted. If the only reason that the Minister could interfere is because of an informed refusal, then surely informed consent would be allowed and deemed a non-negotiable right of the adolescent. Using this argument, it is evident that these teenagers should have the right to give consent if they wish to use cognitive enhancers.

However, there is also research showing that adolescents are not fully capable of informed consent and as such they occupy a middle ground between childhood and adulthood.[95] In this case a middle case approach could be adopted. Flanigan opines that paediatricians could be empowered to assess the patient's level of competence and where necessary to monitor the effects of stimulant use. However, parental permission would not be needed.[96]

3.15 Non-autonomous children (children < 12 years)

In the section above the researcher has explained the position regarding children of 12 years and older.[97] It is imperative that the case of what the situation for children below 12 years of age is dealt with. Should an 11-year-old be denied cognitive enhancers altogether because he cannot decide for themselves. Here again, the law and ethics agree. If the child is not able to make the decision, then the person or people who are entrusted to do what is in the best interests of the child are called on to make the decision. In this case, it would be the parents or other legal guardians of the child.

The Children's Act of 1995, section 128 states:

---

[94] Section 129(8) Children's Act.
[95] P Arshagouni 'But I'm an adult now…sort of – adolescent consent in health care decision making and the adolescent brain' (2006) 9 *Journal of Health Care Law and Policy* 315; A Piker 'Balancing liberation and protection: a moderate approach to adolescent Health care decision-making' (2011) 25(4) *Bioethics* 202-8.
[96] J Flanigan (2013) 325-44.
[97] 3.13.

11) The parent, guardian or caregiver of a child may, subject to section 31[98], consent to the medical treatment of the child if the child is –
    a) Under the age of 12 years; or
    b) Over that age but is of insufficient maturity or is unable to understand the benefits, risks and social implications of the treatment.

It is clear from this that the law is in agreement that if cognitive enhancers were to be allowed then a child under 12 would have to obtain their parent's approval to take such medication. This is both an ethical and legal solution. The under 12-year-old is not viewed as having the capacity of fully understanding the risks involved in taking such medication and therefore would not be able to give informed consent. Without allowing others to decide for the child would create a situation where the child would be prohibited from doing something that could be in his/her best interest until after turning 12.

3.16 Paediatricians as gatekeepers

If cognitive enhancers are made available only through prescription via a doctor, then the doctor may refuse to prescribe cognitive enhancers to patients by justifying the action as the goal of avoiding harm occurring to the child. This is known as paternalism.[99] Passive paternalism refers specifically to the doctor who refuses to provide medication for reasons of patient-centered beneficence.[100] This type of beneficence has been part of medicine for centuries. However, in the 20th-century ethical thinking started to change. Today, it is accepted that the patient has autonomy over his body and should be able to do with it what he pleases.[101] Here it can be seen that there is a need to balance the principle of autonomy with the principle of beneficence.

[98] Section 31 Children's Act 'Major decisions involving the child'.
[99] K Moodley (ed) (2010) 59.
[100] Idem at 61.
[101] Saad T. 'The history of autonomy in medicine from antiquity to principlism' (2018) 21(1) Medical Healthcare and Philosophy 125-137.

The current framework in which children are prescribed medications from their paediatricians can be adapted to accommodate neuroenhancement. This would allow paediatricians to remain as the gatekeepers to stimulant drugs. Paediatricians would need to be open to considering all children (not just those with ADHD) as candidates for prescription stimulants. Those paediatricians who have objections to such prescribing methods would not be forced to see such patients. However, they would need to direct the patient to a doctor that would.

If one takes into account the notion of beneficence then it is apparent that it would be morally praiseworthy for doctors and parents to do their utmost for their patient's and children. It is clear that stimulants have some side effects and therefore it could not be said that parents and doctors are morally required to provide kids with cognitive enhancers. Rather, it is beneficent of them to do so to provide children with greater opportunities and to correct for existing disadvantages. Children above 12 years of age should be allowed to make such decisions for themselves as a basic tenet of their autonomy. Parents have the right to refuse to give their children neuroenhancers just as some parents may prefer to send their children to schools of sub-optimal education or pay for tutors. However, those who do choose the best schools and tutors are the morally praiseworthy kind for doing so.[102]

3.17 Could use of cognitive enhancers ever be completely prevented?

The prevalence of children with ADHD in some schools is 5-10% depending on the area[103]. The first-line therapy for ADHD is methylphenidate (trade name Ritalin or Concerta). It should be clear then that a percentage of children in schools are already on cognitive enhancers to treat their condition. There is no genetic test for ADHD and the diagnosis and treatment of such are thus subjective and relies on the medical professional who makes it[104,105]. Since there will conceivably always be children using these medications in schools it becomes exceedingly difficult to ban the use in kids without ADHD for a few reasons:

[102] J Flanigan (2013) 325-44.
[103] See chapter 2: Clinical Chapter
[104] See clinical chapter at 2.7.2 DSM V criteria for the diagnosis of ADHD.
[105] I Singh 'Beyond Polemics: science and ethics in ADHD' (2008) 9 Neuroscience 960.

Firstly, kids without ADHD will be able to acquire Ritalin from their friends at school. This could be done by receiving it for free or even paying for it thus creating a black market inside our learning institutions. Again, it can be seen that this is already happening. In various studies already mentioned[106] it has been shown that many students obtain methylphenidate from a friend either by being given it or by purchasing it from them.

Secondly, children with ADHD will always be able to receive psychostimulants because they get it as treatment. One cannot merely ban a treatment because others are using it illegally.

Thirdly, even if schools tried to ban psychostimulants for all other kids besides those diagnosed with a condition it would be nigh impossible to try and police such a situation. The school would have to infringe upon the student's autonomy and privacy by conducting random regular drug tests[107]. The situation would be absurd. A school actively pursuing a student for trying to use a tool (albeit a pharmacological one) to study better. What would a just punishment be for trying to study better? And what would happen if many kids were found to continually use them and to get better grades with them? Surely parents will merely move their children to schools that do not impose such bans on these drugs. Even if all the schools in South Africa had to ban these drugs from children without a prescription what would happen to those who opted to home school. Would a system be necessary, as is done with the World Anti-Doping Agency (WADA)[108], where an official can pitch up at any hour of the day or night to do an inspection?

---

[106] See chapter 2: clinical chapter.

[107] The ability to conduct drug tests at school is provided for in the legislation. The South African Schools Act 84 of 1996 s 8A titled: Random search and seizure and drug testing at schools. This section allows the principal or his/her delegate to conduct random searches of a group of learners for any dangerous object or illegal drug. The definition of an illegal drug is defined in the act as
(a)any unlawful substance that has a psychological or physiological effect;
(b)any substance having such effect that is possessed unlawfully."
Cognitive enhancers would fall into the second category of illegal drug and thus a child found in possession of them illegally or a urine test is positive for such substances, he or she will be subject to disciplinary proceedings as per section 8A(12)(a) or 8A(12)(b) of this Act.

[108] The WADA Doping Control Officer's Training Tool Kit Manual May 2011 states "Out-of-competition testing is when an Athlete is tested outside of an event and can take place at *any time* and at *any place*, with no

Furthermore, in this dystopian future must the student let the school know where they are at any hour, day or night, just in case a spot check was to occur. Perhaps a student gets on a plane for a two-week trip overseas to study and cognitive enhance for study break before exams? Furthermore, surely drug masking agents would be made to stop the drugs showing up on blood or urine tests. This would make it even harder for the poor to use these drugs while allowing the rich to have an unassailable lead as these masking agents would undoubtedly be very expensive. It can thus be seen that trying to limit access to cognitive enhancers poses a near-impossible task given that certain people are legally allowed to use them. Yet, just because a drug is prevalent in society should not make it legal for use.

3.18 High prevalence does not a practice make legal

It is clear from studies that the prevalence of use of cognitive enhancers is not uncommon.[109] Yet, just because something is widespread does not mean that it should be accepted. Singh and Kelleher[110], in giving recommendations about paediatric neuroenhancement, opine that legitimizing paediatric neuroenhancement is appropriate given its prevalence.[111] It is trite that such a practice leads society down a slippery slope where anything in that is widespread could be legalised. Smoking was once widespread before its harmful effects became known and this led to laws which aimed to help people stop smoking[112]. This is analogous to allowing underage drinking because it is happening and some view it as "inevitable".[113] However, no society has stopped trying to prevent underage drinking. Singh and Kelleher go on to argue that insofar as paediatric neuroenhancement is happening, it would be better to acknowledge, monitor, and manage this under the supervision of a paediatrician and

advance notice to the Athlete. This means that Athletes may be tested at their home, training locations, workplace or anywhere else they can be found." [Accessed on 17 August 2018 at https://www.wada-ama.org/sites/default/files/resources/files/wada_dco_toolkit_v3_full_en.pdf].

[109] SE McCabe et al 'The use, misuse and diversion of prescription stimulants among middle and high school students' (2004) 39(7) *Substance Use and Misuse* 1095-116.

[110] I Singh and KJ Kelleher 'Neuroenhancement in Young People: Proposal for Research, Policy, and Clinical Management' (2010) 1(1) *AJOB Neuroscience* 3-16.

[111] Ibid

[112] Tobacco Products Control Act 83 of 1993

[113] V Dubljević and E Racine (2018).

parents than to allow minors to self-medicate unsupervised.[114] However, the limitation of such drugs can cause unintended harm as children attempt to obtain these drugs from the black market. These dangers are discussed below.

3.19 Dangers of limits on access

Some critics have emphasized the risks of providing cognitive enhancers to healthy children as long-term data regarding the safety of stimulants is not yet available[115]. If there were to be legalisation with regards to cognitive enhancers it would allow researchers to perform studies on such adolescents and therefore better understand the risks and benefits involved with the use of these drugs. It could be thought that the legalisation of these drugs would prevent people from buying them or other substances purported to be cognitive enhancers on the black market and allow them to go through legal channels to access these drugs. This has been one of the arguments for the legalisation of cannabis. However, research in Canada, where Cannabis has been legalised has shown that black market activity of cannabis has gone up[116]. However, a path to access cognitive enhancers that would include monitoring and patient education of these adolescents could have public health benefits as it allows for the increased health surveillance of these children.

The legal use of neuroenhancements would lead to more parents knowing what their children are taking as children would be more likely to tell their parents about a medication that they were using legally. The ability for adolescents to have access to these drugs legally would open up the possibility for them to ask their parents and paediatricians about these options rather than resorting to buying these drugs illegally off others at school. The recognition of neuroenhancement as a legitimate use for

[114] I Singh and KJ Kelleher (2010) 3-16

[115] B Vitiello 'Pediatric Psychopharmacology and the Interaction Between Drugs and the Developing Brain' (1998) 43(6) The Canadian Journal of Psychiatry 584. It should be noted that Vitiello states that gaps in current knowledge should not deter clinicians from using medications in young patients when there is reasonable evidence of efficacy and safety as psychopathology can be neurotoxic and should not be left untreated.

[116] A Bahji and C Stephenson 'International Perspectives on the Implications of Cannabis Legalization: A Systematic Review & Thematic Analysis' (2019) 16 International Journal of Environmental Research and Public Health 3095

This has occurred largely because there are now legal sources that marijuana can be bought from to sell illegally.

stimulants would also benefit patients. Patients would be able to ask their doctors about dosages and drugs that would work for their specific needs and decide what is the correct dosage rather than have to experiment on themselves. Children struggling at school would also have a source of support by being able to confide in the medical professional about their hopes and worries and their reasons for using neuroenhancements. This will enable the medical professional to monitor the adolescent's academic and social development.

3.20 Arguments against paediatric neuroenhancement

3.20.1 Lack of evidence

Those opposed to paediatric neuroenhancement will point out the lack of evidence that shows the efficacy of stimulants and some safety concerns about extended use. With regards to the safety concerns, it is easily shown that paediatric stimulant use is well studied in paediatric patients with ADHD and few adverse effects have been reported.[117] The judgement of whether a drug is safe enough for public use rests on whether the risks are justified in light of the potential benefits to the patient's overall expected well-being with the medication. In this sense, the benefits of being able to perform better at school could outweigh the side effects of using cognitive enhancers.

3.20.2 Scepticism relating to efficacy

The scepticism present about the efficacy of neuroenhancers may prevent support for legalizing paediatric neuroenhancement. The measure of whether a drug is effective or not is at the heart of this matter. It can be said that medical professionals and patients should deem a drug effective on the basis of whether the patient experiences relief of his or her symptoms after using the drug. This would of course have to be

[117] D Repantis et al 'Modafinil and methylphenidate for neuroenhancement in healthy individuals: a systematic review' (2010) 62(3) *Pharmacological Research* 187-206. Some have argued that the effects of stimulants of a child without ADHD will be more severe than on a child with ADHD because of biological differences. However, this hypothesis has not been established. Furthermore, some parents and patients may be willing to accept higher risks to attain the benefits of neuroenhancement.

tested via research against placebos that could only be properly done once legalization is allowed. If there were a distinct lack of evidence that stimulants have neuro enhancing effects then, because these drugs do have side effects, there would be a case to prevent their use. However, the available research has shown at least some beneficial effects.[118]

The risks and benefits that can occur to the child must be taken into account by the paediatrician, who as the doctor that would be prescribing stimulants to the child will bear liability for not acting in a reasonable manner. If cognitive enhancers are made available without prescriptions, then parents would have to do the risk-benefit analysis for their children under 12 and the child who is over 12 would have to do it for him/herself. Such a reasonable manner needs to be defined. The concerns about side effects would need to be assessed at the level of overall benefits and risks to the child and not exclusively medical risks. As was reported by Fleishmann and Kaliski[119] in their studies, children themselves did the risk-benefit analysis and came up with a solution that allowed them to deal with the side effects while still obtaining the benefits of being able to study better on the medication. It could be assumed that non-ADHD children with or without a paediatrician would also be able to come up with such a solution. If the medication were seen to provide no benefits to the specific child, then the child would be able to discontinue the stimulants.[120] However, trying to generalise that all stimulants would not work for all healthy children clearly undermines research already done[121] and the fact that no medication will work for everyone. A percentage of ADHD children do not respond to Ritalin; does this mean that Ritalin should be discontinued for all? Of course not. The medication needs to be tailored for each child in order for the benefits and side effects to be assessed and then for a plan to be made.

[118] Refer to Clinical Chapter: chapter 2.
[119] A Fleishmann and A Kaliski (2017) at 10.
[120] This position is accepted by Dr William Graf, a paediatrician at the Yale School of Medicine in a report about ADHD for the New York Times. Graf suggested that paediatricians should be allowed to prescribe stimulants to non-ADHD children if they closely monitor the children for side effects (Schwarz 2012).
[121] See clinical chapter: chapter 2

3.20.3 Authentic development of the Child

Authenticity can be defined as: “an ethical ideal that allows the true development of unique individuality and self-fulfilment throughout life”[122]. In adults the topic of authenticity, which falls under autonomy, is important. It is even more important when speaking about children and adolescents who are still forming their personalities, recognizing their strengths and discovering their passions.[123] In each place and culture, the development of authenticity will be unique. It will rely on the parental nurture, social guidance, protection, education, and personal life experiences of the child in question.[124] Parents act as guardians allowing their children to have the experiences that will give them their own authentic self. It is clear that parents try to influence their children in certain ways which will affect their character development. Parents also set boundaries that limit what experiences the child will have.

It is natural for parents to want their children to achieve in their academic career. Parents also encourage their kids in their extra-curricular activities as well as sporting endeavours all of which have an effect on the child’s future personal development. They want their children to live their best lives and may encourage the use of cognitive enhancers to help the child perform the best that he/she can at school, which will help develop their authenticity. However, it has also been seen that some cognitive enhancers may alter personality and constrain the child from developing and acting authentically.[125,126] It has been debated whether cognitive enhancers help children to accept responsibility for their behaviour and thereby develop authentically or hinder it.[127]

Fleishmann and Kaliski[128] showed in their research that children, given the choice, will decide when to and when not to take their ADHD medication. This was based on the

[122] A Fleishmann and A Kaliski (2017) at 10.
[123] PD Kramer *Listening to Prozac* (1993).
[124] WD Graf et al (2013) at 1257.
[125] I Singh ‘Will the “real boy” please behave: dosing dilemmas for parents of boys with ADHD’ (2005) 5(3) American Journal of Bioethics 34–47.
[126] PD Kramer (2013).
[127] I Singh ‘Clinical implications of ethical concepts: moral self-understandings in children taking methylphenidate for ADHD’ (2007) 12(2) *Clinical Child Psychology and Psychiatry* 167–182.
[128] A Fleishmann and A Kaliski (2017) at 10.

findings that these children knew how they acted on and off the medication. The children wanted to get higher marks which they could achieve with the help of the medication while they would stop the medication in order to be their "true-selves" i.e. their authentic selves with friends at social functions. This points to cognitive enhancers being used as a tool when a child wants to study. A tool that is recognised and used as such by the child. The authenticity of the child is thus known intrinsically and while the child's behaviour may change while on the drug, the child knows that such is an effect of the drug and not his or her normal behaviour.

In order to understand fully how authenticity in children works, how it is developed and whether cognitive enhancers affect it negatively or positively will require case-control studies showing how neuroenhancement modifies individual neurodevelopment, functional ability, and personal identity which will be difficult, if not impossible, to obtain. However, even if it does affect authenticity it would not be a valid excuse to stop the use of cognitive enhancers by children. Every technology that children are allowed to use will affect authenticity. Whether it is playing games on a computer or paying for a tutor to lecture the child. Each occurrence will directly affect the child's authenticity in the future.

3.21 Medicalization of hyperactivity to obtain cognitive enhancers

It could be argued that ADHD can be seen as the medicalisation of a symptom group that is a normal variant of human behaviour. This argument has been made by others. The father of medicalization, Peter Conrad, in his book: *Identifying Hyperactive Children: The Medicalization of Deviant Behaviour*[129] argues the same. However, the argument can be taken one step further, it could be suggested that the medicalisation of these symptoms has become normative in order to allow parents and paediatricians an avenue to provide cognitive enhancers in the form of stimulants to their children. A brief detour is needed to see how the symptom complex of ADHD evolved into what it is today.

[129] P Conrad *Identifying hyperactive children: the medicalization of deviant behaviour* (1976).

Medicalisation can be defined as: "the process by which nonmedical problems become defined and treated as medical problems, usually in terms of illness and disorders".[130] Psychiatric disorders gain recognition in the medical world by being included in what is known as the Diagnostic and Statistical Manual of Mental Disorders (DSM). This is considered the official guidebook of psychiatric diagnoses. The DSM can be seen as a repository of medicalized categories, especially those having to do with behaviour. Despite the claims that it is a psychiatric authority, it is also a "mix of social values, political compromise, scientific evidence and material for insurance forms".[131] The DSM has therefore been made into a resource to "secure psychiatric turf" and to sanction psychiatric categories. [132]

In order to understand the medicalisation of hyperactivity into ADHD, it is necessary to trace how it came to be. Even though some have traced ADHD to the early twentieth century[133], it only became a diagnostic category in the 1950s. The disease went through various iterations. At times it was called "minimal brain damage" or "minimal brain dysfunction" (MBD). Other disease names that were tried sound closer to the name that eventually stuck, these were; "hyperactive syndrome", "hyperkinesis", and "hyperactive disorder of childhood". The terms "hyperactivity" and "MBD" became the most widely used names for the disorder. The DSM-II (published in 1968) identified "minimal brain damage" and other problems such as "hyperkinetic reaction" as a childhood disorder "characterised by overactivity, restlessness, distractibility, and short attention span, especially in young children; the behaviour usually diminishes in adolescence".[134] The disorder therefore came to be defined by two overriding symptom groups – inattention and hyperactivity. The diagnosis clearly puts the disease in the category of childhood disease yet notice how the wording here uses the wording "usually diminishes" (i.e. maybe not). The description mentions no solid evidence of biologic markers. Nevertheless, there was an assumption that a biologic connection would be found.

[130] P Conrad *The medicalization of Society* (2007).
[131] H Kutchins and SA Kirk *Making us crazy: DSM: The psychiatric bible and the creation of mental disorders* (1997).
[132] S Kirk and H Kutchins *The selling of DSM: the rhetoric of science in psychiatry* (1992).
[133] LS Goldman et al 'Diagnosis and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adults' (1998) 279(14) *Journal of the American Medical Association* 1100–7.
[134] APA, 50 (1968).

The definition of the illness revolved around the behaviour of the child, especially at school. Since the beginning behaviour has been the descriptive way in which the disease is identified. The main treatment identified was stimulant medications, especially Ritalin. During the 60s the drug became well known mainly due to its use in treating children and the popularity that such treatment started receiving. The 1970s saw ADHD become the most common childhood psychiatric problem[135] and special clinics were set up to identify and treat the disorder. Even then the main medical professionals that diagnosed the disorder were not psychiatrists but primary care physicians and paediatricians.[136] Even though there were no epidemiological studies done in the 1970s to ascertain exactly how many children were diagnosed and treated for ADHD it was estimated that between 3-5 per cent of elementary school students were hyperactive (some estimate as high as 10%).

Today the figures are even higher. In the clinical chapter[137] the prevalence of ADHD in society was discussed. It was shown that the prevalence of ADHD varies widely but is as much as 15% in some areas of the USA. In 2007 approximately 9.5% of children aged 4-17 in the USA had been diagnosed with ADHD.[138] The number of doctor visits for ADHD management and prescriptions for stimulants and psychotropic medications for children and adolescents has increased substantially in the United States over the last 20 years.[139,140,141,142,143,144] The rest of the world is quickly catching up to these statistics and there is no reason to think that the true prevalence in South Africa is

[135] MB Gross and WC Wilson *Minimal Cerebral Dysfunction* (1974).
[136] It should be remembered that because Ritalin is considered a Schedule 2 drug in the United States of America, it can only be prescribed for a month at a time by a doctor. This makes it very lucrative for doctors in terms of prescribing fees.
[137] Chapter 2
[138] CDC-ADHD Data and Statistics (2013).
[139] International Narcotics Board 'Report of the International Narcotics Control Board for 2005' (2005).
[140] Centers for Disease Control and Prevention 'Increasing prevalence of parent-reported attention-deficit/hyperactivity disorder among children-United States, 2003 and 2007' (2010) 59(44) Morbidity Mortality Weekly Report 1439-43.
[141] LA Kroutil et al 'Nonmedical use of prescription stimulants in the United States' (2006) 84(2) *Drug and Alcohol Dependence* 135-43.
[142] L Castle et al 'Trends in medication treatment for ADHD' (2007) 10(4) *Journal of Attention Disorders* 335-42.
[143] PN Pastor and CA Reuben 'Diagnosed Attention Deficit Hyperactivity Disorder and Learning Disability: United States, 2004-2006' (2008) 10 *Vital Health Statistics* 1-14.
[144] JM Zito et al 'Trends in the Prescribing of Psychotropic Medications to Preschoolers' (2000) 283(8) *Journal of the American Medical Association* 1025-30.

anything different. In fact, the global market for ADHD drugs has expanded in the last decade. This indicates that the rising prevalence of ADHD diagnosis and medication is a global phenomenon.[145]

Here, it is pertinent to state and relook at the question previously posed in the clinical chapter:

Given the high proportion of people that have been diagnosed with this behaviour could it not be said that these behaviours are part of the human condition and represent normative behaviour by a certain part of the population?

Francis Fukuyama, in his seminal book "Our Posthuman Future", has considered exactly this and came to a similar conclusion: "There is of course a simpler explanation, which is that ADHD isn't a disease at all but rather just the tail of the bell curve describing the distribution of perfectly normal behaviour."[146] With this in mind it could be argued that ADHD is the medicalisation of a certain part of the population in order to allow them a socially acceptable reason to receive a cognitive enhancer. This gives the excuse that society is not attempting to enhance these children but rather trying to treat them. If this is true, then society will clearly go to great lengths to make sure people do not have to consider themselves as enhancing.

It is clear that the most frequent way that these children are diagnosed based on reports by teachers of the children's behaviour in the classroom after starting school. Furthermore, as can be seen from the diagnostic criteria, the diagnosis of ADHD is based on subjective criteria.[147] This disease could therefore be said to be an environment-specific disease, one that manifests in the classroom. In order to treat the disease and help these children, who are performing below par, have a better chance at succeeding at school they are placed on medication. It just so happens that they are medicated with drugs that have been shown not only to help children that have ADHD based on subjective criteria but rather, most of the human population. In

[145] RM Scheffler et al 'The Global Market for ADHD medications' (2007) 26(2) *Health Affairs (Millwood)* 450-7.
[146] F Fukuyama *Our posthuman future: consequences of the biotechnology revolution* (2002). See also HL Diller 'The Run on Ritalin: Attention Deficit Disorder and Stimulant Treatment in the 1990s' (1996) 26(2) *Hastings Center Report* 12-18.
[147] Clinical chapter: chapter 2.

fact, these medicines are the basis of what is known as cognitive enhancers. It should be clear that whether by design or by accident children with a diagnosis of ADHD have been allowed legal access to pharmaceutical cognitive enhancers without ethical issues of such use as enhancement having to be dealt with.

3.22 Adverse effects and parental consent

The autonomy pertaining to children has previously been outlined in this chapter. Yet, this needs to be balanced with the best interests of the child as stated in the Constitution. When looking at cognitive enhancers it must be understood that they do pose some risks and side effects to children. Parents may want to give cognitive enhancers to their children because they believe it is in the child's best interests.[148]

One should compare cognitive enhancers to alcohol and tobacco. These drugs are not used as cognitive enhancers, but both of these substances are legal for use in society yet pose risks and can result in substance addiction. These substances are prohibited from use in under 18-year-olds. Merely because these substances are used by adults does not mean that society would advocate an "alcohol for all" approach or for a chain-smoker to give his kids tobacco.

Another substance that must be looked at is caffeine. It could be argued that since caffeine is a cognitive enhancer that has side effects greater than the ones that have been mentioned previously and yet is freely available to children. The argument could be made that these newer cognitive enhancers should also be made available for children to use even if they do have side effects. The first argument that Dubljević uses against this is that caffeine does not have the same physical harm assessment as has been shown with Ritalin and therefore is not comparable[149]. It was shown in a study using the Multi-Criteria Drug Harm Scale which ranked the mean physical harm of Ritalin (1.32) above tobacco (1.24).[150] The second argument made by Dublejević is

[148] J Flanigan (2013) 325-44.
[149] V Dubljević and E Racine (2018).
[150] D Nutt, et al 'Development of a rational scale to assess the harm of drugs of potential misuse' (2007) 369(9566) *Lancet* 1047–53.

that while caffeine is perfectly acceptable for adults to use at the same time those same adults would not give coffee to their children.[151] Furthermore, the use of caffeine has been questioned by various authorities over the last few years[152] and the use of caffeine for stimulation can lead to negative effects, including substance dependence.

While it could be agreed that merely because a substance is used by adults it does not automatically mean that one would give it to children. The fact remains that caffeine is still freely available for use by children while Ritalin, Adderall and modafinil are not. This is despite the various side effects that caffeine has addiction potential. It seems hypocritical of society to allow the one while not allowing the others. Ritalin, Adderall and modafinil all have much better effects on cognition as compared to caffeine.[153] These drugs have been found to be safe enough for use in children with ADHD. The risk to benefit ratio is clearly different in those that do not have ADHD yet if there are other factors such as low socioeconomic status or overcrowding that could be overcome with such medication then the risk-benefit ratio could be tipped in favour of use.

3.23 Conclusion

This chapter has focused on paediatric neuroenhancement. It is clear that cognitive enhancers do and will play a major role in many children's lives. Currently, these drugs are prescribed to children with ADHD. They are also obtained via different methods by children that do not have ADHD for use as cognitive enhancers. The reasons put forth by various critics have been discussed. Whether it be that cognitive enhancers will only be used by the wealthy to get further ahead compared to the poor or that cognitive enhancers are a form of cheating, these arguments have been dealt with and have been shown to fail when compared to other technologies that are available to children every day. This chapter also dealt with the legislation with regards to informed consent by the child. An adolescent over 12 who is mature and of sound

[151] V Dubljević and E Racine (2018).
[152] CHS Ruxton 'The suitability of caffeinated drinks for children: a systematic review of randomised controlled trials, observational studies and expert panel guidelines' (2014) 27(4) *Journal of Human Nutrition and Dietetics* 342-57.
[153] See clinical chapter.

mind would theoretically be able to give informed consent for him/herself while a child under 12 would need their parent's consent.

Lastly, the concept of ADHD as a form of medicalization was dealt with. This thesis argues that the diagnosis of ADHD has become a tool to place children on cognitive enhancers while calling these drugs treatment rather than enhancement. The chapter as a whole is put forth to argue that adolescents should be allowed their right of autonomy to decide whether or not they would like to use cognitive enhancers. The legislative framework that will be presented at the end of this thesis will take the lessons learnt from this chapter and place them in a framework that will also deal with situations where children would be able to access cognitive enhancers.

This chapter has dealt with the legal and ethical arguments surrounding cognitive enhancement use by children in South Africa. Children have been dealt with separately as they are a special population vulnerable to others in society and therefore society must make sure it does what is in the best interests of the child. The next chapter deals with the ethical considerations regarding the use of cognitive enhancers by adults in South Africa. This will allow for the ethical considerations of the vast population of South Africa to be taken into account.

Chapter 4: Ethics of pharmaceutical cognitive enhancer use in adults

4.1 Introduction

Cognitive enhancers are used by both children and adults. The previous chapter dealt with the legal and ethical concerns relating to cognitive enhancer use in children. However, the ethical concerns relating to adults are different to those in children. The term adult pertains to anyone that is above 18 years of age and therefore may consent to the use of prescription medication, such as potential cognitive enhancers, both from a legal and ethical standpoint in South Africa. The use of cognitive enhancers is a contentious issue. There are various arguments for and against their use. The aim of this chapter will be to take the reader through these arguments in order to come to a better understanding, from an ethical viewpoint, on whether or not they should be allowed for use by adults in South Africa and if so under what conditions.

For the past two decades, there has been an intense ethical debate on the use of medicines beyond traditional medical goals. While many of these medicines have been created to treat disease, they have also been found to enhance human capacities beyond normal human function.[1] The ethical concerns of adults acquiring and using cognitive enhancers will be dealt with using the Beuchamp and Childress model of principlism. This model has 4 pillars or principles that make up the ethical pillars of medicine. These pillars are Autonomy, Beneficence, Non-Maleficence, and Justice.[2] They form an analytical framework that allows one to work through ethical dilemmas that may be encountered in medical practice and research.[3] This framework will be used look at the ethics of cognitive enhancers in a systematic way.

4.2 Non-maleficence

[1] JR Savulescu et al (eds) *Enhancing human capacities* (2011).
[2] TL Beauchamp and JF Childress *Principles of biomedical ethics* 6 ed (2009).
[3] K Moodley (ed) *Medical ethics, law and human rights: a South African perspective* (2010) at 41.

Non-maleficence is based on the principle of *primum non nocere* – first do no harm.[4] The doctor's duty is to make sure that they minimise harm to patients[5]. This is a fundamental obligation of all doctors. In order to prevent the patient from being harmed by drugs that the doctor may prescribe, such drugs are put through various trials whereby their safety is gauged. Once the drug has been shown to be safe in certain dosages and in certain populations the drug is approved by the relevant authorities – in South Africa, it is the South African Health Products Regulatory Authority (SAHPRA)[6] while the USA has the Federal Drug Association (FDA) – for use. Safety concerns by the public usually focus on the risks that may occur from the use of internal biological enhancements i.e. cognitive enhancers. The term, external enhancements covers a wide gambit of technologies and actions that people use in order to cognitively enhance themselves. The major one being education that everyone has a right to in South Africa and that children in South Africa are legally obliged to attend is education.

4.2.1 Safety of cognitive enhancers

The clinical effects and side effects have already been summarised in the clinical chapter. However, the ethical considerations pertaining to the side effects have not.

In order to create an ethical assessment, their possible benefits must be weighed against their possible risks. This assessment is a typical utilitarian one where the outcomes are assessed to come to an ethical conclusion. The utilitarian approach produces a rather positive assessment of cognitive enhancers. As Harris[7] has stated, if one wants to make the world a better place, then one needs not only to change the world but change human nature as well even if this would mean that our descendants are not viewed as human. This can all be seen to stem from the motto of utilitarianism:

[4] The principle is based on the premise that before you try to help someone that may be sick, first make sure that you do not make them even worse. The same has been said in another field. Warren Buffett, the famous investor has opined that the first rule of investing is "Don't lose money".
[5] A Dhai and D McQuoid-Mason *Bioethics, Human Rights and Health Law* (2011) at 14.
[6] Medicines and Related Substances Act 101 of 1965 (hereafter 'MRSA') states at s 2A that the objects of authority of the SAHPRA are to provide for the monitoring, evaluation, regulation, investigation, inspection, registration and control of medicines, Scheduled substances, clinical trials and medical devices, IVDs and related matters in the public interest.
[7] J Harris *Enhancing evolution* (2007).

"the greatest good for the greatest number of people"[8]. Harris argues that enhancement, in general, is justified because on the whole, it will make people: "longer-lived, stronger, happier, smarter, fairer".[9] Finally Harris argues that cognitive enhancer use should be encouraged if they bring good and if they are safe. It can be seen that cognitive enhancers do have benefits, especially in certain sub-groups.[10]

Most cognitive enhancers appear to have minimal side effects when used therapeutically[11], however, the lack of studies into cognitive enhancers means that the safety of their use is currently not known in normal people for extended periods of time. There is some evidence that the use of cognitive enhancers by normal individuals leads to an increased risk of dependency.[12] However, the evidence does not state what the extent of the addiction potential could be. Furthermore, caffeine is a somewhat addictive substance that is the most widely used cognitive enhancer in the world, yet it has not been banned. This shows that the addictive potential of a cognitive enhancer is not itself enough for it to be banned.[13]

The fact that cognitive enhancement drugs are already prescribed for some diseases shows that they have been found to be safe in those population groups. In South Africa, methylphenidate is the preferred drug for children or adults with ADHD, as it is throughout the world. Provigil is readily used for people suffering from narcolepsy or shift-work disorder. In the USA, amphetamine salts are also available for children or adults with ADHD. However, at the current time, not enough information is known to give a definitive answer as to the safety of cognitive enhancers. Fortunately, this situation is not new. Many drugs may be ethically prescribed off-label for patients if the doctor believes that it will help the patient. Until such definitive proof can be brought as to the safety of cognitive enhancers in normal people for extended periods of time it would the principles of authority and non-maleficence together dictate that society

[8] This, in fact, was not what the early utilitarian, Jeremy Bentham stated. He said "the greatest happiness of the greatest number is the foundation of morals and legislation. This statement is paraphrased to the one above.
[9] J Harris (2007) at 5.
[10] See clinical chapter.
[11] Ibid
[12] SK Bell et al 'Lessons for enhancement from the history of cocaine and amphetamine use' (2012) 3(2) *AJOB Neuroscience* 24–9; AD Mohamed 'Modafinil has the potential for addiction' (2012a) 3(2) *AJOB Neuroscience* 36–8.
[13] Ibid.

should let the doctor and patient decide as to what risks the patient is prepared to accept.

In order for risks to be accepted one must have benefits to weigh them with. According to this approach, the use of cognitive enhancers in individuals with high intelligence would have to be found as unethical. The "inverted u-wave" effect of these drugs show that it is unlikely that there will be any benefits in these individuals, and they could perhaps even cause a decrease in performance. From this angle and without further evidence of benefits in the high intelligence sub-group; from a safety viewpoint cognitive enhancers cannot be ethically recommended to these individuals.

Let us perhaps take aim at the argument to allow cognitive enhancers even if they did have side effects that were clearly harmful. Would this then show that cognitive enhancers must be banned from public consumption? In order to answer this question, two examples of substances available in society today that fit these exact criteria will be brought, i.e. freely available and have substantial side effects. This thankfully is not a hard task. The case of alcohol and tobacco need only be brought forth. Both of these have active drugs, being ethanol and nicotine. These drugs along with others found in tobacco that are harmful to the human body are freely available in society to anyone over the age of 18. This is because alcohol and tobacco have become norms in society that are allowed. These drugs, it should be pointed out, have no or very little beneficial value (in the case of nicotine this is not strictly true. Nicotine has been shown to act as a cognitive enhancer[14]). This is in contrast to cognitive enhancers which have been shown to have a benefit to people. What these drugs do have are major side effects. Tobacco has been found to be the leading cause of preventable deaths in the USA. In the United States alone smoking causes 480,000 deaths a year.[15] Alcohol can cause addiction and dependency. It can have negative effects on the brain, heart, liver and pancreas. Furthermore, it can lead to cancer in the mouth, liver, oesophagus, throat

[14] DM Warburton 'Nicotine as a cognitive enhancer' (1991) 16(2) *Progress in Neuro-Psychopharmacology & Biological Psychiatry* 181-91.
[15] Centre for Disease Control and Prevention (CDC) 'Health effects of cigarette smoking' https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm (accessed on 4 August 2018).

and breast.[16] Let us juxtapose this to cognitive enhancers. As was seen in the clinical chapter, methylphenidate, amphetamine salts and modafinil have been shown to be safe for use. The side effects have been shown to be minor compared to the benefits and this has allowed these drugs to gain FDA approval for use among people with certain disorders. Here it can be seen that safety criteria are subjective based on societal norms. A drug that caused 480,000 deaths a year in the United States. If such a drug was put forth for approval at the SAHPRA for human use it would be laughed at and would never come to market, yet tobacco is available to anyone in South Africa over 18. The argument comes down to the fact that tobacco and alcohol are available to the public without prescription yet have many side effects and nearly no beneficial effects whereas cognitive enhancers have beneficial effects and minimal side effects, yet the detractors would have them banned from any use including a prescription from a doctor.

4.2.2 Risks present in education and cognitive enhancement

Education in South Africa, as well as most other countries, is considered a right and by law in South Africa children must attend school until the age of 16. Yet, education is not a risk-free enhancement as many may believe that it is. Education can enhance various cognitive functions, but it can also be used for evil, nurturing fanatics, sophists, dogmatists, rationalizers, or manipulators. All of these skills can be learnt and therefore taught by education. Furthermore, the education given to a person could be completely false information merely intended to brainwash the individual into a certain way of thinking. Negative effects of education can even be seen in "high-quality education". Several studies have shown that the study of economics can cause students to become more selfish than they were before.[17,18]

The fact remains that cognitive enhancers are digested and then have their effect on the mind whether it wants it or not whereas education is absorbed by the student and then actively digested through the brain and solidified by the person. However, on

[16]C Vincenzo Bagnardi 'Alcohol consumption and the risk of cancer: a meta-analysis' (2001) 25(4) *Alcohol Research and Health* 263-270.
[17] RH Frank et al 'Does studying economics inhibit cooperation?' (1993) 7(2) *The Journal of Economic Perspectives* 159-71.
[18] A Rubinstein 'A sceptic's comment on the study of economics' (2006) 116(510) *The Economic Journal* C1-C9.

closer inspection, this argument does not hold. Education is directed at a person who many a time may be too young to even understand what he/she is learning. Brainwashing a child may occur with no pharmacological intervention. At an older level, the subject matter will usually affect the individual based on the person giving over the material and how it is presented. It is doubtful that everything that one is taught first goes through rational deliberation before being learnt. Rather much of the information that is heard and seen is absorbed through the subconscious and assimilated into our overall knowledge of the environment. This is perhaps one of the reasons that "fake news" is able to spread so quickly.

It is clear that both modes of cognitive enhancement have their respective risks. Yet, the risks associated with cognitive enhancers are more pertinent because of the medical risk system that is currently in use. This system uses the risk versus benefit profile of a treatment that has been mentioned previously. It is risk-averse to enhancements as they do not reduce morbidity risk while their utility may be non-therapeutic, subjective and context-dependent.[19] This, fortunately is not the only risk model that occurs in medicine.

4.2.3 Cognitive enhancement modelling off Cosmetic Surgery

There is another that is already used for enhancements, albeit external in nature. This is for cosmetic surgery. Cosmetic surgery as with all surgery has risks involved. However, cosmetic surgery has been accepted by society for many years because it allows the patient to decide whether the risks and benefits are sufficient to the patient to go through with the surgery. This model could be used for cognitive enhancements, thus allowing patients to decide what risks they are willing to accept in order to increase their neurological function. The link between cosmetic surgery and neuroenhancers has already been made with some even referring to cognitive enhancers as cosmetic neurology[20]. Again, here the differences are seen between something that occurs externally; surgery, and something that occurs internally; taking

[19] N Bostrom and A Sandberg 'Cognitive enhancement: methods, ethics, regulatory challenges' (2009) 15(3) *Science and Engineering Ethics* 311-41 at 323.
[20] A Chatterjee 'The promise and predicament of cosmetic neurology' (2006) 32(2) *Journal of Medical Ethics* 110-13.

cognitive enhancers. Cosmetic surgery allows the patient to assess subjectively whether the results are favourable. This would also be true with patients who use cognitive enhancers and thus to try to assess the risks and benefits would have to be weighed up by each patient according to their specific circumstances.

4.2.4 Cheating

There are many forms of cognitive enhancement that society has already accepted. Society has education and computer technologies that allow our cognitive functions to improve exponentially from what came before. These cognitive enhancers have clearly been accepted and embraced by society at large. Yet cognitive enhancers in the pharmacological form are looked down upon and viewed as cheating in some cases. This shows us that the debate is not about the ends. Cognitive enhancement is accepted as these other means have been accepted. Rather, it is the means that have caused the debate to occur.[21]

One of the concerns about pharmaceutical cognitive enhancers is that it is a form of cheating.[22] The use of enhancers would cause individuals to be better placed in terms of being able to compete against their colleagues who do not enhance.[23] Those who do not enhance would be at a clear disadvantage. If someone is not able to enhance it would clearly be unfair to expect them to compete with those that don't. However, just because something is unfair does not necessarily mean that it is cheating. Cheating would entail breaking a law, norm or rule against enhancement use. If someone chooses not to use a smartphone that person cannot go and say it is unfair that others use it.[24]

When deciding whether the use of cognitive enhancement is unfair, or cheating depends upon which is more valuable to society: the existence of a level playing field

[21] A Miah 'Ethical issues raised by human enhancement' in F Gonzalez (ed) *Values and ethics for the 21st century* (2011).
[22] F Fukuyama *Our posthuman future: consequences of the biotechnology revolution* (2002).
[23] N Bostrom and R Roache 'Ethical issues in human enhancement' (2008) 2(3) *Nanoethics* 317–27.
[24] M Dunlop and J Savulescu 'Distributive justice and cognitive enhancement in lower, normal intelligence' (2014) 32(3-4) *Monash Bioethics Review* 189–204.

on which individuals can compete equally or the value of achievement as the result of competition.[25] There are various areas of life and knowledge acquisition that are not zero-sum games i.e. more for me does not mean less for you. One such area is the advancement of knowledge. The creation of new technologies and innovations or the solution to big problems may have a greater value than maintaining a level playing field. Scientific researchers that are given cognitive enhancers may be able to make breakthroughs that otherwise would not be possible. An uneven playing field in these environments may be advantageous as it encourages individuals to work harder in order to compete with their peers. One could argue that the detractors of cognitive enhancement must show why it is that a level playing field is so important and why society should limit technologies such as cognitive enhancers so that everyone can compete in the playing field.

The competition in these fields is not the main priority but rather the achievement. The ends in these cases are so high that they justify the means of having to allow the use of cognitive enhancers to get to those ends.[26]

4.2.5 Safety of trials

The development of cognitive enhancers would require that research is done to show that the drugs are safe for use in individuals without the diseases that the drugs have been registered for. The trials would also need to show whether the drugs indeed cause cognitive enhancement and the strength of the enhancement achieved. To place a person on a drug trial with no intention to decrease morbidity and mortality would be uncharted territory for medicine. The people placed in such a trial could be exposed to unforeseen risks while any benefits are uncertain.[27]

There is a model that would allow trials to be done while decreasing harm. Use the people that are already taking cognitive enhancers. In the clinical chapter, it was shown that many university students are using cognitive enhancers. These adults are already on the drugs and thus would not be forced to do anything different and expose

[25] R Roache 'Enhancement and cheating' (2008) 2(2) *Expositions* 153–6.
[26] M Dunlop and J Savulescu (2014) at 199.
[27] N Bostrom and A Sandberg (2009) at 323.

themselves to any further harm than what they already expose themselves to. Furthermore, the data collected would allow the adequate assessment of the risks of using cognitive enhancers.

4.2.6 Dependency on external technologies

Cognitive enhancers could become a technology that needs to be ingested every day in order to keep up with the demands of society. Any interruption to the supply of cognitive enhancers could lead to society not functioning properly. The withdrawal of these drugs may also lead to withdrawal symptoms and impairments of function. It could be argued that humans should try relying on the least amount of technology. This argument misses the fact that society already relies on vast amounts of technology for our day to day living. Whether it is our computers for information and work pace, agriculture for our food, electricity to give us lights, it can be seen that society has already become dependent on many external factors to make modern living possible.

4.3 Beneficence

Beneficence can be defined as doing good and actively promoting goodness, kindness and charity. Doctors have a responsibility to provide beneficial treatment and to minimise harm.[28] This is different to benevolence in that it is an action rather than just wishing good for others.[29] In order to do this, the doctor needs to be up to date with the latest medical information pertaining to what could benefit and cause harm to the patient. The rules of beneficence as defined by Beauchamp and Childress[30] are as follows:

1. Protect and defend the rights of others
2. Prevent harm from occurring to others
3. Remove conditions that will cause harm to others
4. Help persons with disabilities

[28] K Moodley (ed) (2010).
[29] A Dhai and D McQuoid-Mason (2011) at 14.
[30] TL Beauchamp and JF Childress *Principles of biomedical ethics* 7 ed (2013).

5. Rescue persons in danger

Let us concern ourselves with rule 2. Here it can be seen how the ideals of beneficence and non-maleficence join together to make a wall that protects the patient. Where non-maleficence instructs the doctor to do no harm, beneficence comes to tell the doctor to protect patients from harm. In the case of cognitive enhancers, this gives us an extra dimension to think about. Doctors must not only prevent themselves from harming the patient but also prevent the patient from being harmed. As discussed above, the doctor's duty is to make sure that any cognitive enhancer is safe for the patient to use. This is done by adhering to the latest guidelines and studies of medications and other procedures. This however presents a problem because the studies that have been currently done on cognitive-enhancing drugs are of low quality or had small sizes of patients. It is thus important for the doctor to take into account that the full picture of the safety profile of a medication may not have as yet been revealed and to tell the patient accordingly to prevent harm occurring to the patient.

Another rule that relates to cognitive enhancers is rule 4, to help persons with disabilities. In the South African context, the person may have lower, normal intelligence or in fact be classified as mentally disabled. Surely a doctor needs to take this into account and provide cognitive enhancers to such people. Individuals with external disabilities such as bad eyesight or leg amputations are readily given the means to fix such impairments. The beneficence to do the same for someone who is suffering from a cognitive deficit would be to relieve his or her disability by providing access to cognitive enhancers.

An aspect to take into account when dealing with beneficence is paternalism. Paternalism can be defined as "the intentional overriding of one person's known preferences or actions by another person, where the person who overrides justifies the action by the goal of benefitting or avoiding harm to the person whose preferences or actions are to be overridden"[31]. In the case of adults, passive paternalism would be used in that the doctor may refuse to provide cognitive enhancers to the patient.[32] This

[31] TL Beauchamp and JF Childress *Principles of biomedical ethics* 5 ed (2001).
[32] K Moodley (ed) (2010) at 59.

would occur if the doctor does not believe that cognitive enhancers work or that they are not safe. In either way, the doctor will be acting out of beneficence to the patient. However, this method of thinking is outdated. In today's day and age, autonomy has come to be seen as the overriding factor in many cases where conflict appears. Therefore, it is for the patient to decide if he or she wishes to take cognitive enhancers. Ultimately, beneficence comes down to doing good. In South Africa where there is a large population that could be helped by cognitive enhancers through the benefits of increased concentration, attention, and memory enhancement it would be seen as beneficent to provide people with the means to enhance such. As will be seen in the section of distributive justice, the case for beneficence for the use of cognitive enhancers is increased in certain patient sub-groups that would probably benefit more than others.

4.4 Justice

This principle refers to fairness. In healthcare, justice refers to the fair treatment of patients. This principle considers whether the individual is properly treated when considering the broader picture of society as a whole.[33] Justice is based on the understanding as a society that there is an obligation to help people in need of medical treatment but may not have the means of obtaining that treatment.

The different types of justice that may be considered are[34]:

Legal justice – respect for morally acceptable laws. The principle of justice creates an obligation on lawmakers to create laws that are fair to patients. This is why it is important for people to have some knowledge of the laws that impact healthcare.[35] When something goes wrong with the healthcare delivered to the patient or the law is not fair then a sense of injustice is created which needs to be corrected also utilising the law – through redress, compensation or repeals and new laws coming into effect. While the law is a contributory factor to resolving ethical dilemmas such as that of

[33] A Dhai and D McQuoid-Mason (2011) at 15.
[34] K Moodley (ed) (2010) at 73.
[35] Idem at 73.

cognitive enhancers it is beyond the scope of this chapter and will be thoroughly discussed in the chapters specifically looking at the law in South Africa. Nevertheless, it must be stated that knowledge and respect for morally acceptable laws is an ethical requirement via the principle of justice. When determining whether the legal framework that will be proposed for cognitive enhancers is adequate it shall be assessed whether the framework is legally just.

Rights-based justice – respect for people's rights. A right is regarded as an entitlement to something that is considered valuable. Examples of rights from the Constitution of South Africa[36] include the Right to Privacy and the right to basic healthcare. These rights are reflected in the National Patient's Rights Charter[37]. Rights and obligations are fundamentally linked and go hand in hand. In the context of cognitive enhancers, it could be posited that if a person has a Right to make his or her own decisions then the doctor has an obligation to prescribe cognitive enhancers for the patient if requested.

Distributive justice – the fair distribution of limited resources. Discussed below.

Legal and rights-based justice will be discussed in the legal chapter dealing with adults. Below distributive justice and cognitive enhancers will be dealt with.

4.4.1 Distributive Justice

Justice must be considered when dealing with the distribution of scarce resources. This is done using the terms: fairness and desert – i.e. what one deserves and giving each their due.[38] Distributive Justice can be defined as: "fair, equitable and appropriate distribution in society determined by justified norms that structure the terms of social co-operation". All categories of justice are important. However, in third world countries

[36] The Constitution of the Republic of South Africa, 1996 (hereafter the 'The Constitution, 1996').
[37] Health Professions Council of South Africa (HPCSA) 'Guidelines for good practice in the healthcare professions booklet 3: professions national patients' rights charter' (2008).
[38] K Moodley (ed) (2010).

such as South Africa, there are limited resources that need to be apportioned appropriately.[39]

South Africa is an extremely unequal society. It has one of the highest GINI coefficients, 0.65, in the world.[40] Thus, it is clear that South Africa has a large gap between the wealthiest and poorest and that the distribution of wealth in South Africa is one of the worst, if not the worst in the world.

Technological innovation does not just help the rich, due to its downstream effects, it ends up having an effect on everyone. Just twenty years ago map books were popular in order to find the location that you were going to. Then the Global Positioning System (GPS) system came along that is utilised by companies such as TomTom and Garmin. These systems allowed one to buy a device that could fit in their vehicle and would advise them how to get to their selected location. These devices cost thousands of rands and could only be afforded by middle to upperclass individuals. However, GPS chips were then added to phones and Google introduced their app called Google Maps to the world. Today a phone that costs R300 and is attainable by almost everyone has can run Google Maps. This illustrates the power of technology to breakdown advancements until the poorest have access to something that previously only the rich could afford.

The same is true with cognitive enhancers. People pay small fortunes to help themselves study and work more effectively. Whether its tutors and private schools for kids or the best universities and latest technologies (laptops, cellphones, etc.) for adults. Trying to study and work at the most effective pace and get the maximum out of every minute of work and study is a costly business. However, cognitive enhancers can help do this and at a fraction of the price. Certain medical professionals have come to understand this in the school setting. They have commented about how cognitive

[39] Ibid at 74.

[40] World Bank 'The world bank in South Africa' available at http://www.worldbank.org/en/country/southafrica/overview (accessed on 16 July 2018). The GINI coefficient measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. A GINI index of zero represents perfect equality and 1, perfect inequality.

enhancers are the cheapest and quickest fix to help people enhance their performance.[41]

It is clear that in South Africa there is a situation where the needs to educate everyone adequately is resource intense. The people that can afford a good education in private schools will help their children get into good universities, which will lead to good jobs. Those that can't will have to send their children to public schools with mostly inadequate learning facilities both at home and at school which will lead to poor performance and a drop out of the student or poor marks.[42] This could result in not being allowed into university with all the job opportunities a degree brings out of reach as well. However, this cycle can be broken, and it does not need to take years or massive investment in schools. The answer would be as simple as allowing those who would like to take cognitive enhancers the right to take them. If people cannot afford nootropics for themselves or their children, then they could be made available for free via the public health sector.

Intelligence is distributed unequally across society. However, the cognition level which someone is born with (measured by IQ tests) has been shown to correlate highly with many key determinants of well-being. Numerous studies have found that increased cognition improves the likelihood of specific markers of well-being such as increased income, improved quality of health and reduced mortality. There are different levels of intelligence which affect people to different degrees.

A borderline intellectual disability is defined as a person with an IQ below 75.[43] This has been shown to result in a high chance of failing elementary education, mastering tasks of daily living and being classified as unemployable. These individuals are at risk of living in poverty and being dependent on social grants.
Mild to moderate lower, normal intelligence is defined as individuals with an IQ of 75-90. These people still have a significant risk of living in poverty and being dependent

[41] See clinical and paediatric chapters for more details.
[42] The Economist 7 January 2018 'South Africa has one of the world's worst education systems' https://www.economist.com/middle-east-and-africa/2017/01/07/south-africa-has-one-of-the-worlds-worst-education-systems (accessed on 31 July 2018).
[43] M Dunlop and J Savulescu (2014) at 193.

on social grants, although not to the same level as those with an IQ less than 75. Another quality that is has been shown to result in improved determinants of wellbeing is impulse control. Impulse control and intelligence have not definitively been shown to be dependent or independent of one another.[44]

There are different principles of distributive justice[45]. Below is a discussion of three of these principles with regards to cognitive enhancers.

4.4.1.1 Egalitarianism

Egalitarianism states that every individual should have equal opportunities for a good life which translates into equal opportunities for goods, such as social grants, health, housing and education, this is achieved through personal effort and social grants programmes[46]. In a society where people can use their income to increase their level of welfare, the use of cognitive enhancers would help people with lower IQs to increase welfare equality by increasing intellectual capacity. Since cognitive enhancers would increase intelligence, it would increase job prospects especially of people with a lower IQ. As previously mentioned, an IQ of below 90 puts a person at a greater risk of being unemployable. The threshold for employability has been found to be 75-80. Therefore, for people with an IQ of below 80, would now be able to obtain a job, become employable and have access to utilities only available to employable individuals. The use of cognitive enhancers in lower, normal intelligence individuals will help them to become employable. The benefit of these people obtaining jobs is two-fold. Firstly, they will be able to support themselves and not rely on the state to support them, thus be able to contribute to economic growth. Secondly, there will be greater resources available for those that still remain dependent on the state due to the increased taxpayer base and the decrease of those dependent on social grants.[47]

Thus, from an egalitarian point of view cognitive enhancers have the potential to allow lower IQ individuals to increase their intelligence and be more equal to other's IQ

[44] Ibid.
[45] TL Beauchamp and JF Childress *Principles of biomedical ethics* 5 ed (2001) at 74.
[46] K Moodley (ed) 2010.
[47] M Dunlop and J Savulescu (2014) at 193.

levels. An increase in intelligence can be viewed as an all-purpose good. This is because as intelligence increases one's ability to make intelligent decisions about money, life goals and decisions also increase. Lower IQ increases the likelihood of bad financial decisions. Therefore, a higher IQ would reduce wealth disparities that are due to poor money management. Due to the "inverted U effect" of cognitive enhancers the individuals who have previously been most disadvantaged due to a low IQ will derive the greatest benefit. This shows that cognitive enhancers have the potential to reduce inequality and lead to relative welfare equality.

4.4.1.2 Prioritarianism

The principle of prioritarianism states that the greatest priority in treatment should go to those that are worst off even if it results in fewer gains for society then another strategy would result in. Individuals with lower, normal intelligence are the worst off in society, as stated previously, in a wide range of social factors compared to those with normal or above normal intelligence. Therefore, under this principle, any cognitive enhancers must prioritise the access and benefit of these people. There are two cases to be made. One where only those with lower, normal intelligence receive cognitive enhancers and another where all of society can access them[48].

Even if both of these scenarios pan out then there is another method in which the lower, normal intelligence would still benefit. This would be due to the externalities derived from society, in general, having higher intelligence. It has been proposed that even a small rise in intelligence would derive a large social benefit by the invention of new goods and services that would benefit all of society.[49] The universal access to cognitive enhancers would allow the general population to become more productive and creative. This would lead to an increased to contribute to society and create innovations which would have the possibility to improve the absolute position of all those who have access to them. This was previously the case of medicines, vaccines and modern plumbing. An example of technological innovation that has especially increased the absolute position of those in third world countries is the mobile phone.

[48] These two types of distribution have been set out in M Dunlop and J Savulescu (2014) at 194-7.
[49] A Sandberg and J Savulescu 'The social and economic impacts of cognitive enhancement' in J Savulescu et al (eds) *Enhancing human capacities* (2011).

These benefits ultimately trickle down to everyone including the worse off, who benefit from them. This shows how the cognitive enhancer does not just benefit the user, but rather benefits everyone including those worse off.[50]

4.4.1.2.1 Targeted cognitive enhancement

Targeted cognitive enhancers, i.e. cognitive enhancers only given to those with lower, normal intelligence would only benefit those most in need of it. The use of these by even a small portion of this group that would elect to use it would give them the ability to improve their social position both relatively and absolutely. In this instance, there is no worry that cognitive enhancers will become a positional good because access is limited to those that are most in need of it. This would lead to a reduction in the difference of intelligence and associated disadvantage between the general population and the worst off.[51]

In theory, this method could work but in practice, it would undoubtedly fail. There is already a case study as to why this would not work. Those who are deemed to need Ritalin, a cognitive enhancer, i.e. those with ADHD, have access to it as needed. Yet research has found that the general population in many instances is given or buys it off these individuals. It is argued that in this instance those with lower, normal intelligence could end up being exploited because they would become conduits for others to get their hands-on cognitive enhancers.

4.4.1.2.2 Universal cognitive enhancement access

The universal use of cognitive enhancers to all people and not to those who are worse off would seem to negate any advantages that may have been experienced by the worse off lower, normal intelligence individuals; these are individuals with an IQ below 90. However, it can be argued that there are ways in which these individuals would actually benefit from such a policy. Firstly, in this instance, the lower, normal intelligence individuals would still have access to cognitive enhancers and all the

[50] M Dunlop and J Savulescu (2014) at 194.
[51] Ibid at 195.

benefits that may accrue from personal usage. Relatively they would still be worse off but their absolute position with relation to non-positional goods such as potential job employment and better decision making would still increase. As has been mentioned above, the increased efficacy of cognitive enhancers in the lower, normal intelligence individuals would likely still result in an increase in the relative position of this group as well. Thirdly, as has been argued in other sections in this thesis, this would prevent these individuals from becoming conduits for others to access cognitive enhancers.

The policy to allow universal access of cognitive enhancers might have the effect of benefiting the well off more than the worse off. It has already been argued that a closed access model is impractical. Furthermore, as has been shown above, the universal model would still allow the absolute position of the worse off to improve and because of innovation, there is a possibility that it might actually benefit the worse off more than a closed-access model. A final point to leave the reader with here is that social grants come from tax money which could greatly increase because of the greater productivity of individuals in general.[52]

4.4.1.2.3 Not so fast

Prioritarianism concerns itself with helping the worse off to increase their absolute position in society. It is incumbent on us to see where the maximum benefit would be derived from. It is amusing to note that this principle may actually advocate that, if there were only a certain number of cognitive enhancers, then it should rather be given to those with normal and above normal intelligence. This could occur if it were determined that by giving it to those with higher IQs would lead to greater productivity and innovation which in turn could lead to a greater elevation in the absolute position of all society. This situation would fulfil the criteria of prioritarianism more fully regarding the just distribution of cognitive enhancers.[53]

The outcomes that maximise the absolute position of the worse off is of critical import. Any gains in absolute position due to indirect benefits of universal coverage or access

[52] Ibid.
[53] Ibid at 196.

only to those with above, average intelligence may outweigh any loss in the relative position that would be felt due to the increased access amongst the upper class. If the reduction in absolute position is greater with restricting access to those individuals with higher intelligence, then this method would gain priority. On the other hand, if improvements of absolute position are greater by using the universal access model, due to the social benefits generated being larger then it would be used. Both methods show that a world in which cognitive enhancers are used would lead to a greater improvement in the absolute position of the worse off as compared to one without any access to cognitive enhancement.

4.4.1.3 Utilitarianism

The principle of utilitarianism states that society should distribute resources so as to bring the greatest good to the greatest number of people[54]. Therefore, the justification for using cognitive enhancers would mean that they supply the greatest good in society compared to other methods that may have been used. If cognitive enhancers had to be made a good that is accessible from public health care, it would be hard to justify an enhancement as opposed to the relatively inexpensive benefits that are derived from medications such as HIV meds. Therefore, it could be argued that the targeted use of cognitive enhancers could be used to increase the utility of a certain sub-group of the population more than other factors would. This has been stated by Sandberg and Savulescu[55]:

> If certain enhancements provide significant increments in well-being and these are greater than the benefits of certain medical treatments or other uses of community resources, then they should have priority and to not provide such enhancements would be as unjust as failing to provide basic level education or health care.

An example of such a case is that of iodizing salt in areas where low iodine intake is common. The iodization of salts costs about 2-3 cents per person per year yet cause

[54] K Moodley (ed) 2010 at 74.
[55] A Sandberg and J Savulescu (2011).

an increase in fetal IQ of 10-15 IQ points. Therefore, a cognitive enhancer, in this case, is effective as it increases the utility of this population.

In lower, normal intelligence individuals the use of cognitive enhancers could result in the utility increasing to such an extent to make it cost-effective. This could be done in two ways.

Firstly, as has been stated previously, cognitive enhancers have an “inverted U effect”. This effect of cognitive enhancers predicts that to maximise utility gains, lower, normal individuals should be given cognitive enhancers as it offers the greatest gains per person at the same cost as a broader distribution. This would make the case for cognitive enhancer use in this population justifiable.

Secondly, the improvements in cognition provided by cognitive enhancers, small as they might be would provide improvements in individuals with lower, normal intelligence. It has been stated that an increase of a mere 3 IQ points in lower, normal intelligence individuals significantly reduces their odds of social disadvantage. This could be compared to normal or above normal individuals where such an increase does not show significant gains and therefore does not have the same utility. The increased utility of the lower, normal intelligence subgroup would result in increased well-being due to an increased capacity of these individuals to contribute to society. The benefits i.e. utility that cognitive enhancers would bring to the general society can be seen as aggregative. The subgroup in question would decrease their dependency on social grants, increase their capacity to contribute to society and reduce unnecessary expenditure on such individuals by the different public institutions such as the health and legal systems.

However, the principle of utilitarianism may support the opposite of the above argument. As with prioritarianism, here increasing the utility of the whole of society is being dealt with. Utilitarianism states that resources should be shifted to whoever will put them to their most socially productive use. One way to do this may be to rather give cognitive enhancers to normal or above normal intelligence individuals. This

would be justifiable if it could be proved that such use would result in breakthroughs and innovation that would benefit all of society. [56]

Utilitarianism may not justify universal access of cognitive enhancers; however, it shows that in certain subgroups the use of cognitive enhancers should be made available as the utility brought about causes them to be justifiable.

4.4.1.4 Libertarianism

This theory is based on the ability of those who are able to pay for their healthcare. Those who can pay should be entitled to it while those who can't should not. This theory is in favour of private healthcare.[57] Sententia[58] gives a libertarian viewpoint that public policy decisions about cognitive enhancement should be based on the democratic right of everyone to safeguard their own thought processes rather than paternalism and moralism. She argues that what is paramount is for each person to have the information available to decide for themselves what is an acceptable risk. Thus, she argues that what is most important is the ability to pay and the autonomy to decide. Once these two criteria have been met the patient should be given the choice of what drug they wish to consume without further interference from the doctor.

The idealistic libertarianism expressed by Sententia is impractical in the real world. Many people do not live in democracies where education and access to information are a given. She also supposes that people will be educated enough to be able to give informed consent. If this approach were to be adopted it must be realised that the freedoms enjoyed in our society are not universal and that many of these drugs will not be able to be used where they could make an impact, i.e. those living in less democratic or in less educated societies, and in poorer situations.[59]

[56] M Dunlop and J Savulescu (2014) at 197.
[57] K Moodley (ed) (2010) at 74.
[58] W Sententia 'Neuroethical considerations: cognitive liberty and converging technologies for improving human cognition' (2004) 1013 *Annals of the New York Academy of Science* 221-8.
[59] DC Turner and BJ Sahakian 'Neuroethics of cognitive enhancement' (2006) 1 *Biosocieties* 113-23.

In a third world setting such as South Africa, this theory has pros and cons. The benefits are that those that can afford it will be able to access cognitive enhancers at will. However, the poor and of lower, normal intelligence, the ones that could potentially benefit from such enhancers the most, would be unable to access these drugs.

4.4.1.5 Communitarianism

This theory holds that communities should decide what their healthcare needs are and how resources should be distributed in order to fill these needs. The healthcare needs of a community are prioritised over those of individuals.[60] In a community with low income, it could be decided that a certain portion of the healthcare budget should rather fund cognitive enhancers rather than conventional treatment as this may uplift the community through increased school grades, university degrees and better jobs.

4.4.2 Social inequality

One of the greatest fears about cognitive enhancements is that their use will result in a society with a hierarchical structure of those who use cognitive enhancers and those who do not.[61] The use of enhancements could cause a divide between those with access to these drugs and those who don't. The well-off population who already have access to other cognitive enhancement technologies such as better parenting, tutoring, nutrition and computer access. The access to cognitive enhancers would add additional technology to the well-offs causing them and their offspring to have an added advantage to the not well-offs.[62]

While this situation is a possibility, there is also another. There is the possibility that cognitive enhancers could increase social equality. People are born with different levels of intelligence due to genetic and socio-economic factors. It has been shown

[60] K Moodley (ed) 2010 at 74.
[61] The President's Council on Bioethics 'Beyond therapy: biotechnology and the pursuit of happiness' (2003); F Fukuyama (2002); G Wolbring 'The unenhanced underclass' in P Miller and J Wilsdon (eds) *Better humans? The politics of human enhancement and life extension* (2006).
[62] SE Hyman 'Cognitive enhancement: promises and perils' (2011) 69(4) *Neuron* 595–8; A Sandberg and J Savulescu (2011).

that an individual's level of intelligence will have a greater effect on their quality of life than any other cognitive enhancement.[63] This level of intelligence is further augmented by education, private tutoring, and computing power that are only available to the well-off. These factors all contribute to unjust inequality that is rampant in South Africa as well as the rest of the world.[64]

The cost of cognitive enhancers is relatively cheap[65] thus making them the cheapest cognitive enhancers as compared to other forms of cognitive enhancement. Due to their cost, they have the potential to become universally accessible. In South Africa, where those who cannot afford private healthcare have free access to public healthcare could access these medications. This would result in cognitive enhancers being freely available to the poor in South Africa and thus create a system where everybody has access to a type of cognitive enhancement. This negates the argument that cognitive enhancers would only be available to those who could afford it.

4.4.3 Conclusion

It can be seen from the arguments presented above that the use of cognitive enhancers can be justified by the principle of distributive justice. This may be done because the "inverse u-effect" of cognitive enhancers specifically lends itself to creating a society that allows those with a lower, normal intelligence to break free of their genetics and increase their intelligence. Furthermore, due to the relatively low cost of pharmacological cognitive enhancers as compared to other more conventional types of cognitive enhancers such as private schools, tutors, and expensive technology, it allows for the universal access of these pharmaceuticals to be made so that they may benefit all of society and not just those that can afford it. In South Africa, this is even more important due to the inequality present.

[63] RJ Herrnstein and CA Murray *The bell curve: intelligence and class structure in American life* (1994); LS Gottfredson 'Why g matters: the complexity of everyday life' (1997) 24(1) *Intelligence* 79–132.
[64] M Dunlop and J Savulescu (2014).
[65] A 10mg tablet of methylphenidate is priced at R3.90 per tablet by the Medicines Price Registry for 2018.

4.5 Autonomy

Autonomy can be simply stated as self-rule. This principle espouses the right of each and every individual to make decisions for themselves.[66] With regards to healthcare, this means that the patient should be allowed to make the final decision with regards to his or her own treatment after he or she has been provided with all relevant information. This principle does not apply to persons who are not viewed as being autonomous as a result of immaturity, being incapacitated, or ignorant.[67]

The rules that are justified by autonomy are[68]:

1. Tell the truth
2. Respect the privacy of others
3. Protect Confidential Information
4. Obtain consent for interventions with patients
5. When asked, help others make informed decisions

When dealing with the use of cognitive enhancers in adults, various principles come to the fore. These are discussed in this chapter. When a patient has the capacity to make his or her own decisions then autonomy is considered the dominant principle.

The reason for autonomy being so crucial can be summed up by a quote from Isaiah Berlin.

> I wish my life and decisions to depend on myself, not on external forces of whatever kind. I wish to be the instrument of my own, not of other men's acts or will. I wish to be a subject, not an object: to be moved by reasons, by conscious purposes, which are my own, not causes which affect me, as it were from outside. I wish to be somebody, not nobody: a doer – deciding, not being decided for, self-directed and not acted upon by external nature or by other men as if I were a thing, or an animal, or a slave … I wish, above all, to be conscious

[66] A Dhai and D McQuoid-Mason (2011) at 14.
[67] K Moodley (ed) (2010) at 42.
[68] TL Beauchamp and JF Childress *Principles of biomedical ethics* (2001).

> of myself as a thinking, willing, active being, bearing responsibility for my choices and able to explain them by references to my own ideas and purposes.[69]

A key aspect of autonomy concerns rule 5 mentioned above dealing with informed decisions. This refers to helping others make informed decisions. It is a doctor's duty to give the patient the necessary facts concerning their request in order to allow the patient to make an informed decision. Making decisions is one of the main aspects of autonomy. A person needs to be able to express their autonomy by deciding for themselves. However, if the person does not have the facts at hand to decide or has the wrong facts then the decision cannot be said to be informed and the autonomy of the person is compromised.

Many detractors of cognitive enhancers have stated that these drugs should not be allowed for patients' consumption. This, however, is against the current climate of autonomy be the principle that is supreme when two different principles come into conflict. If one looks at the situation it can be seen that there is a clash between the principle of autonomy – allowing a person to choose for themselves whether to use cognitive enhancers – and the principle of beneficence – doing good by the patient, specifically the concept of passive paternalism where the doctor refuses to do something for the patient because he or she feels that it will harm the patient. In this case, as in others, the medical practitioner should understand that paternalism is frowned upon in the current medical landscape. The principle of autonomy triumphs and provided that the patient has given their informed consent to wanting the drugs then the patient should be able to make the decision to use enhancers. If one looks at the current situation, it is much easier to ban drugs on the basis of side effects rather than on the basis that they are bad for the soul, or in modern medical language, on the basis of psychological effects alone. Fukuyama opines that if a company were to create a soma like Huxleyan substance that made a person happy with no side effects there is every possibility that it would be allowed. The concept of autonomy in modern society compels us to argue that society should stop worrying about other people's

[69] Referred to in K Moodley (ed) (2010) at 42.

souls or internal states and let people enjoy whatever drug they so choose as long as it doesn't harm anyone else.

4.5.1 Enhancing autonomy with cognitive enhancers

The opponents of the use of cognitive enhancers may base their argument on the potential for cognitive enhancers to decrease the autonomy of the individual. However, let us not only reject their argument but also see if cognitive enhancers could enhance the autonomy of the individual. The concept of enhancing the autonomy of an individual is not a new one. Some have attempted to promote autonomy by removing common psychological biases.[70]

To ascertain whether cognitive enhancers could be used to increase the autonomy of an individual, it is important to first define what cognitive abilities have a direct effect on the autonomy of a person. Shaefer et al.[71] have opined that autonomy is intrinsically related to people's reasoning, deliberative and evaluative capacities. The relation that occurs can be seen as a positive one. The more reasoning, deliberating and evaluating a person can accomplish the greater their autonomy could be. Reasoning can lead to greater autonomy in three ways: competence, comprehension i.e. avoiding false beliefs, and critical analysis. These capacities can be used to fend off external threats to autonomy such as arguments and claims made by others, as well as internal ones such as a person's own reasons, values and arguments. Deliberating entails doing something consciously and intentionally in a careful and unhurried manner. By doing this, rash decisions can be avoided that could have led to unwanted events. These could include gambling problems, crimes of passion, and rushed investment decisions. Lastly, there is evaluating, this entails assessing one's options and coming to a solution.

By increasing these aspects of reasoning, the level of autonomy that a person has could be increased. It has already been shown that modafinil, a popular cognitive

[70] J Savulescu 'Rational desires and the limitation of life-sustaining treatment' (1994) 8(3) *Bioethics* 191-222.
[71] GO Schaefer et al 'Autonomy and enhancement' (2014) 7(2) *Neuroethics* 123-136.

enhancer is able to increase the reflective time in chess games. This suggests that it increases the evaluation and deliberation of the person.[72] The point here is that cognitive enhancers may intrinsically increase the autonomy of a person which would allow that person to be able to increase their self-rule.

4.5.2 Authenticity

Authenticity is defined as:
"the quality of being authentic" [73]
Authentic is defined as:
"known to be true or genuine"[74]

The ethical debate around authenticity differs based on two different understandings of the concept.[75]

1. Self-discovery view (essentialist view): authenticity means being true to oneself, listening to the inner-voice that guides us to becoming human that is distinctive to each person. Each of us has such an inner voice and being authentic means modelling our life on the demands of this voice.
2. Self-creation view (existentialist view): authenticity means not accepting who we are at present but constantly trying to mould ourselves into who we would like to be. There may be arguments as to how free we are to shape ourselves, however, authenticity denies that we should consult some predetermined self that tells us how to live our lives.

Thus, it can be seen that both views take up the concept of being a true or genuine person. Striving to be the only one of us and not merely copying others. The way that the person is created may be different, nevertheless, the end goal is to be authentic.

---

[72] AG Franke et al 'Methylphenidate, modafinil, and caffeine for cognitive enhancement in chess: a double-blind, randomised controlled trial' (2017) 27(3) *European Neuropsychopharmacology* 248-60.
[73] AS Hornby (ed*) Oxford advanced learner's dictionary special price edition* (1998) at 67.
[74] Ibid.
[75] Different authors refer to the self-discovery and self-creation by other names. For example, when referring to the two sides Charles Taylor refers to "boosters" of modernity as those who understand authenticity to be self-creation while the knockers of modernity are those who view authenticity to be self-discovery: C Taylor *The ethics of authenticity* (1991) at 11.

If one looks at the view that authenticity is about self-discovery then cognitive enhancers provide a dilemma. Herein there is a pill that will make a person smarter. However, the person was not born this way, and therefore this would lead to the person developing in a way that a more intelligent person would develop. This would cause the person to become inauthentic to what he or she should have ended up as. The self-creation camp would be in favour of such a drug as it allows a person to self-create. A person can become smarter with a pill thus truly creating the person that they want to be. No longer does one have to accept their intelligence but can rather choose how intelligent she wishes to be. In this instance, humans would be able to truly overcome nature and surpass their natural limits. There is another angle to look at this. Let us say that a person should actually naturally be very intelligent, yet due to external stimuli, say low socio-economic status and many distractions she is not able to show her true potential. The act of using a cognitive enhancer here is not one of denial of the true self but rather a beautiful cure that removes the obstacles that prevent this individual from living as her true self.

The problem with cognitive enhancers is that they would be viewed as a shortcut to excellence. Studying well into the night would become a thing of the past as students are able to take a pill and grasp vast amounts of information. With this shortcut to excellence, one must ask whether it would reduce the value of cognitive abilities as an authentic characteristic and make the ability commonplace? Would it make cognitive abilities less genuine? As *Syndrome*, the evil villain in the film; *the Incredibles* believed: When everyone has superpowers, no one has superpowers.[76] By making these abilities available to all, they would be viewed by society as decoupling these abilities from genetics and upbringing. It even decouples cognitive abilities from hard work. An aspect that the self-creation proponents would take issue with would be if this shortcut to excellence were available, then the determining factor of failure or success would be access to such shortcuts. Shortcuts in society do occur and society accepts it. Society does not denounce athletes for wearing performance-enhancing shoes nor individuals for using the latest computer hardware and software to perform their tasks quicker. These shortcuts allow the athlete to concentrate on their talents of

[76] Walt Disney Pictures 'The Incredibles' (2004).

speed and endurance rather than developing thick soles. They also allow for example the actuary to focus on understanding the results of her data analysis rather than the rote practice of writing out equations. These examples show that cognitive enhancement, which could be targeted at extending a person's talents, would enable a person to concentrate on more difficult challenges than they could without.

Authenticity, as has been said previously, means that something is genuine. Being authentic is about choosing what it is you want and not allowing others to choose for you. However, if cognitive enhancers are not a free choice. If enhancements become a must-have and not a nice to have, does that mean that people's bodies will come under the will of others who entice them to take cognitive enhancers and cause them to be less authentic? Some critics have voiced their concerns that the concept of human enhancement is part of a technocratic mindset[77]. This is in keeping with the self-discovery view where what nature gave a person is accepted and a person is prepared to live their life making full use of what has been given using their inner-voice to guide their life. From this point of view, enhancement and the concept of trying to overcome this inner-voice is a denial of built-in authenticity. Human nature becomes a project which one tries to overcome using technological mastery.[78]

On the other hand, the ability of cognitive enhancements to play a positive role in authenticity should not be missed. These drugs are able to amplify our capacities required for autonomy and independent judgement. They can therefore help us lead a more authentic life by enabling us to base our choices on increased introspection. A case in point is the drug Modafinil that has been shown to help a person to be more introspective. Modafinil and Methylphenidate have also been shown to limit impulsive choices.[79]

The fact that a person knows that the ability is not theirs could create cognitive tension. A cognitive ability that is natural requires no external force. It is merely present in the individual whether they want it or not. The use of cognitive enhancers requires that the

[77] The President's Council on Bioethics (2003).
[78] LR Kass *Life, liberty, and the defense of dignity: the challenge for bioethics* (2002).
[79] See Clinical Chapter.

user knows that the ability is due to an external enhancement technology, it cannot be said to be "owned" by this person. Take away the drugs and you take away the abilities. These cognitive traits would never be innate but rather manufactured traits and could even feel foreign to the user's true identity.[80] In the existentialist view, the user is creating something, even if this is with external means that act internally. In the essentialist view of authenticity, the user is still pushing past what nature intended, what the true-self was capable of doing and therefore causes a problem of authenticity.[81]

A literal view can be taken of authenticity. According to this view, authenticity is the challenge of presenting ourselves accurately to the outside world. In this sense the standard of whether someone is authentic or not while on cognitive enhancers would be determined by whether she tells people that she is taking cognitive enhancers, which give her these abilities. If she is claiming to have natural cognitive abilities whilst she is actually using cognitive enhancers, then it is obvious that her authenticity has been compromised and she is acting in a fake or phoney manner. However, if she were to tell others that she has made the choice to use cognitive enhancers and her cognitive abilities have been increased due to these drugs then she is still maintaining her authenticity.[82]

The argument that enhancers alter personal identity seems implausible when applied to cognitive enhancers. This argument would propose that the use of cognitive enhancers create new moral beings together with their own achievements and merits. The law recognises that when a person is intoxicated it diminishes mental capacity and responsibility. In this instance, the person's mental capacity may fall below that for rational thinking and self-control. However, the reverse can be seen with cognitive enhancers where capacity is in fact increased due to increased attention and reasoning. Even with substances such as alcohol, the person's responsibility is

[80] A Kadlac 'The challenge of authenticity: enhancement and accurate self-presentation' (2018) 35(4) *Journal of Applied Philosophy* 790-808.
[81] Ibid.
[82] Ibid.

adversely affected and does not cause a new moral agent to occur with decreased capacity.[83]

4.6. Cognitive enhancers as the next arms race?

An arms race occurs when two or more entities compete to outmatch each other. The word refers to the occurrence of such in military warfare where the different sides will attempt to beat their opponent/s based on superior weapons. If each army uses the same weapons, then the armies are probably equally matched. This is why research is done in order to try and develop a weapon to obtain an edge on one's opponents. The different sides will each be working on researching different weapons and the race implied is one where whoever develops a new weapon first will have the edge in the war.

Cognitive enhancers can be seen as a technology that can cause a whole new neurological arms race to occur. First some examples:

- You board your flight that will be taking you from South Africa to the USA non-stop. The trip time, you are told is 20 hours. You can just imagine how tired the pilot must get trying to stay awake for the complete duration of the flight. Thoughts of the plane going down in flames enter your mind and you begin perspiring. Not to worry though. The pilot's voice comes over the intercom informing you that he is on cognitive enhancers and therefore his super-human concentration will easily last the whole flight. You settle in feeling calm and relaxed.
- Jimmy started vomiting at 5 pm. His mom thought it was nothing to worry about but when he is still vomiting at 12 pm his mom gets worried that it might be something bad and rushes him to the local public hospital. There, in casualty, she consults with a doctor who has been on call for 30 hours. The doctor briefly examines Jimmy for a few minutes. The doctor looks tired, but Jimmy's mother has no other option. The doctor finishes up and says that it's just mild food

[83] F Santoni de Sio et al 'Why less praise for enhanced performance?' in F Jotterand and F Dubljevic (eds) *Cognitive enhancement: ethical and policy implications in international perspectives* (2016).

poisoning. He tells her to keep Jimmy hydrated and if he does not get better to bring him back to the hospital. Jimmy and his mom return home. However, he gets worse during the night and by the next morning, he can barely move and is in agony. She rushes him back to the hospital where another doctor that has just come on call diagnoses Jimmy with meningitis and starts treatment. Unfortunately, because of the delay in treating Jimmy, he died. Jimmy's mom is now suing the hospital for negligence of the doctor that was on call for 30 hours and missed her son's diagnosis.

These two cases put in the spotlight exactly why cognitive enhancers could lead to an arms race amongst society.[84] A person would rather see a doctor who is on cognitive enhancers and is able to concentrate better even after having not sleeping for 30 hours. A person would also rather fly with a pilot who has super-human concentration than an average one with which mistakes may be more likely to occur. Thus, people would be more likely to get certain jobs based on whether they would be willing to take cognitive enhancers. Furthermore, those that have access to more effective cognitive enhancers than the next person would be even more likely to obtain the job. In this sense, cognitive enhancers would become what is known as a positional good. This is a good whose value is dependent on others not having it. In this case, the arms race causes a waste of time, effort, and money as people spend significant resources to keep up with everyone else. By moving the cognitive level of function continually higher would result in a situation where there is no net gain in social utility to compensate for the costs of the enhancements.

Many cognitive functions are not positional goods and therefore this argument does not hold. These cognitive functions are valuable in and of themselves and not because someone else does not have them. A person having a good memory or being creative is valuable in and of itself and not by virtue of the next person not being creative. Society faces a torrent of pressing problems that would be solved more readily if could wiser, smarter and more creative people were attacking these problems. By solving these problems, the whole world becomes a better place and not just for those that

[84] M Dunlop and J Savulescu (2014) at 199.

solved it. These solutions are the externalities that are created by people taking cognitive enhancers. Not only does it benefit the users but also people around them.

This, however, does not stop us from having to assess the impact that competitive aspects of cognitive enhancers may have on society. It should be clear that there may come a time where the penalties placed on a person that does not enhance will be severe enough that most people will be forced to enhance for employment opportunities.[85] Notice here that to take cognitive enhancers will be entirely voluntary and yet the pressure placed on a person to enhance makes it doubtful as to whether the choice is voluntary at all. This is not the first instance that a choice that is voluntary is made involuntary by society. In the 19th and 20th century literacy was needed in the western world in order to be able to work in many professions. In the modern world, it is near impossible to be a functional human being without being able to read. Furthermore, in the 21st century if one is not computer literate then it has also become virtually impossible to attempt to obtain a job or function in society. Despite these coercive pressures and despite the fact that literacy and computer literacy change the way people behave and think, these are not deemed to be problematic. These enhancements have been accepted by society to the point that they are virtually mandatory. Therefore, it should not be seen as far off to expect that one day the same situation would manifest itself with regard to cognitive enhancers.

4.7 The purpose of medicine

Medicine is defined as[86]:

1. The science of preventing and curing illness and disease, e.g. by drugs, diet or surgery.

Thus, it is clear that medicine is thought of as returning a person to normal function. Enhancement, on the other hand, is defined as[87]:

[85] A Chatterjee 'Cosmetic neurology: the controversy over enhancing movement, mentation and mood' (2004) 63(6) *Neurology* 968-74.
[86] A Hornby (ed) 1998 at 728.
[87] Ibid at 383.

Enhance: to increase or improve further the good quality, value or status of something.

The two terms tend towards and from the point of normality. The one attempts to help the patient reach normality while the other attempts to push the person above normality. Normality, however, is a thin line which can so easily be stepped over and as can be seen from the modern world is hardly an easy line to pinpoint. So often medicine already steps straight over the line between treatment and enhancement. This is clear from examples that are not intended to cure but rather to prevent or ameliorate illness. These examples include cosmetic surgery and preventative medicine such as vaccinations. Other enhancements that are of a medical nature include psychological techniques given to patients to improve their lives or diets prescribed by dieticians.

The underlying concern here is that society will try to create medical solutions for every problem. These will displace efforts such as the struggle of learning material for university to get good grades or confront social and personal problems to be psychologically intact. Instead, people will take a cognitive enhancer or (as already happens) a sedative or anti-depressant to help them get through their day without having to confront their problems in an external practical sense. In the paediatric chapter extensively mention was made about the concern that society has of allowing children to take Ritalin and other medications even when diagnosed with ADHD. These drugs are viewed by some as a quick fix that should rather be dealt with by society through better parenting and teaching methods.[88]

This argument disregards the fact that today's society is not the same as 30, 40 or 50 years ago. The amount of information that needs to be retained and the pace of modern living do not allow the luxury of doing things the old-fashioned way. Just as a secretary would not be able to keep up without a computer to type on so people may not be able to keep up without cognitive enhancers. Many people struggle to keep up with modern living and it is especially these people that may benefit from taking

[88] N Bostrom and A Sandberg (2009) at 324.

cognitive enhancers.[89] The human species has been adapting and evolving through natural and technological means for many thousands of years and the use of cognitive enhancers can be seen as yet another technological invention that allows us to adapt to our current environment.

Medicine has been focused on as a science above. However, let us look at what medicine (the drug) is defined as. The place to look for a definition of what medicine is considered in South Africa is the Medicines and Related Substances Act. In the Act it states:

"medicine" means any substance or mixture of substances used or purporting to be suitable for use or manufactured or sold for use in –

a) The diagnosis, treatment, mitigation, modification or prevention of disease, abnormal physical or mental state or the symptoms thereof in man; or
b) Restoring, correcting or modifying any somatic or psychic or organic function in man, and includes any veterinary medicine.[90]

The above speaks in terms of treating a disease. Yet no disease is present when using enhancers. The aim is to enhance and not to treat. Society may attempt to medicalise enhancement in order to bypass this limitation. However, in the long term, this is untenable. Surely, a situation wherein large swathes of the population are diagnosed with disorders in order to utilise drugs should be viewed with contempt. The major problem with the current state of affairs is that medicine cannot be classified as having an enhancement role because the definition does not allow for such a use of a drug to be made. But perhaps the underlying problem lies in the goals specified for medicine.

The goals of medicine are the activities that form part of medical practice and the professional duties of doctors in relation to these activities. A Hastings Center report published in 1996, which was contributed to by many experts from fourteen countries identified four main principles that in the experts' opinion would help maintain the

[89] Ibid.
[90] Section 1(1) MRSA at "medicine".

integrity of medicine “to maintain its integrity in the face of political or social pressures to serve anachronistic or alien purposes”.[91] These are:

1. 1) The prevention of disease and injury and the promotion and maintenance of health;
2. 2) The relief of pain and suffering caused by maladies;
3. 3) The care and cure of those with a malady and the care of those who cannot be cured; and
4. 4) The avoidance of premature death and the pursuit of a peaceful death.

The purpose of defining the goals of medicine was done in order to stop medicine from crossing boundaries into subjects that many believe has no relation to its core goals or values. The major aim is to stop medicalization i.e. the increasing influence that medicine has on society.[92]

Yet, these goals do not fit tightly with the definition of health as contained in its constitution: "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[93] The Constitution further states that: “The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being …”.

The WHO has also specifically defined Mental health: “Mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.”[94]

The words “not merely the absence of disease or infirmity” are of particular importance when discussing cognitive enhancements. Thus the WHO has in its constitution recognised that in order for a person to achieve well-being it is not enough to merely stop the disease. Rather, the individual must be able to realize his or her own potential.

---

[91] Hastings Center ‘The goals of medicine: setting new priorities’ (1996) 26(6) *Hastings Center Report Special Supplement* S1–27.
[92] R Meulen et al *Rethinking Cognitive Enhancement* (2017).
[93] Preamble of the Constitution of the World Health Association, 1948.
[94] World Health Organization ‘Mental health: a state of well-being’ available at: http://www.who.int/features/factfiles/mental_health/en/ (accessed on 2 August 2018).

In order to do this, it could be argued that cognitive enhancers should be given to allow the person to be the best version of themselves.

A question that should be asked is whether cognitive enhancement is medicalization in action.[95,96] Cognitive enhancement can be seen in one of two ways. Cognitive enhancement cannot be said to cure any disease, but, as can be seen in this chapter, it may promote health and help avoid a premature death due to bad decisions.[97] The question that keeps rearing its ugly head is thus. How does society define health and disease? Kass believes that medicine should limit itself to restoring normal functioning by treating physical and biological diseases,[98] while Boorse believes that functions typical to a certain species should be ascertained. Boorse then argues that health equals "normal functional ability". However, if one looks carefully it will be seen that health and wellness in some aspects are culturally defined and are based on value judgements and prejudices that change over time. Examples of this are masturbation which used to be considered a disease, or homosexuality, which was only removed from the Diagnostic and Statistical Manual of Psychiatric Disorders (DSM) in 1974.[99] It is argued that the distinction between normative and enhanced is normative and not objective as Boorse would like us to believe. Rather, treatment and enhancement are culturally defined based on a cultural definition of what is a disease and what is not. This argument leads me to believe that what is a treatment and enhancement will become increasingly harder to define and cognitive enhancers will be increasingly used as society redefines what is healthy. The question that should rather be asked is whether one should continually create new diseases to treat or rather call a spade, a spade and call what is being done enhancement.

However, Juengst comes to put this whole argument into perspective. Juengst argues that the line between medical treatment and enhancement is not one of medical tolerance but rather of medical obligation, or to put it simply, what must the doctor do

[95] P Conrad *The medicalization of society* (2007).
[96] For a discussion on medicalization related to ADHD in children and the use of methylphenidate please see the paediatric chapter.
[97] R Meulen et al (2017) at 20.
[98] L Kass*, Toward a more natural science* (1985).
[99] HT Engelhardt 'The disease of masturbation: values and the concept of disease' (1974) 48(2) Bulletin of the History of Medicine 234–48.

rather than what can the doctor do.[100] He further states that doctors should be able to deny prescribing cognitive enhancers to patients if it goes against their professional judgement. However, they should still refer the patient to someone who will prescribe them such drugs.[101] As it shall be seen later in this thesis, this distinction becomes very important when policy-making regarding free access to services at public hospitals in South Africa. In other words, what is a medical necessity and what should be left for private funding in respect of self-improvement? The conclusion here is a practical one that has been already adopted by cosmetic surgery. Don't stop a patient from enhancing, just make sure that it does not become a societal burden.

4.8 Off-label prescriptions

The term off-label means that the drug is being used in another way or for a disease other than those specified in the conditions of the registration of the drug and as reflected by the drug's labelling[102]. In South Africa, any medicine is under regulation and must be approved by the South African Health Products Regulatory Authority (SAHPRA)[103]. The fact that the drug is used off-label does not necessarily mean that it is not effective or unsafe to be used in this way.[104] Off-label use has become an important part of medical practice worldwide.[105]

The off-label use of a medication should be seen as riskier as it has not been specifically registered for such purposes. However, the risks involved have received

[100] E Juengst 'What does enhancement mean?' in E Parens (ed) *Enhancing human traits: ethical and social implications* (1998).
[101] This approach is not new. Abortions in South Africa are done by doctors. However, this does not mean that a doctor has to do an abortion if it goes against their religious or ethical beliefs. As long as the doctor refers the patient to another doctor that is willing to do the abortion then there can be no claim of abandoning the patient. S 15 The Constitution, 1996
[102] SA Strauss "'Off-label' use of medicine: some legal and ethical implications" (1998) 19(1) *SA Practice Management* 12-19.
[103] SAHPRA has replaced the Medicines Control Council (MCC), which used to be the authority in regulating pharmaceuticals in South Africa. The change is due to the mandate of the SAHPRA being expanded to include not only medicines, but also medical devices including in-vitro diagnostics, and aspects of radiation control.
[104] J O'Reilly and A Dalal 'Off-label or out of bounds? prescriber and marketer liability for unapproved uses of FDA-approved drugs' (2003) 12(2) *Annals of Health Law* 295-324.
[105] V Henry 'Off-label prescribing' (1999) 20 *Journal of Legal Medicine* 365-83.

relatively little attention compared to the USA.[106] Registration entails proving certain facts regarding the safety and effectiveness of a medication. This acts as a check against harmful or ineffective medicines being made available to the general public. Extra care must be taken by the doctor when prescribing medication off-label. The ability of a doctor to prescribe medication off-label is a delicate balance between the regulation of medication and the ability that a doctor should have to prescribe medication that, in their opinion, will be beneficial to the patient.[107]

The cognitive enhancers that are the most used and that I refer to in this thesis are amphetamines (Adderall), methylphenidate (Ritalin, Concerta) and Modafinil (Provigil).[108] These drugs are all classified as prescription drugs and therefore are regulated by the MRSA and SAHPRA. These drugs have been registered with the council to be used by individuals who have certain diseases. This allows for these drugs to be used to treat diseases. Section 14 of the MRSA forbids the sale of unregistered medicine. Unfortunately, there is no category for medicines to be registered for a condition called "cognitive enhancement". Furthermore, due to the ethical and legal questions pertaining to these drugs that have been mentioned in this thesis, large clinical trials to ascertain the benefits and risks of such pharmaceutical use in individuals cannot at the present time be fully examined.[109]

The current situation will now be examined. There is a way to access drugs that are not registered for a certain disease. The method entails a doctor prescribing the drug to a person off-label. This may seem bizarre that a doctor should have the power to prescribe any drug for anything that he or she sees fit. Yet, this is exactly the case that is currently used. In an attempt to allow doctors to use medications that they believe will help their patients they may prescribe drugs that have not been registered for such uses. In the case of cognitive enhancers, this would be the only way that a doctor could prescribe these drugs to a medical user that is not diagnosed by ADHD. This shows that a doctor has full control over what medication to prescribe to individuals.

---

[106] RM Jansen 'The off-label use of medication in South Africa – what about some information for medical practitioners?' (2009) 99(6) *SAMJ* (2009) 438.
[107] MJ Mehlman 'Off-label prescribing' (2005) http://www.thedoctorwillseeyounow.com/content/bioethics/art1971.html (accessed on 31 July 2018).
[108] See chapter 2: clinical chapter.
[109] See chapter 6

The doctor is protected as long as it can be shown that a reasonable doctor would have acted in the same way.

This situation should briefly be examined. A doctor may give a prescription to a client for whatever he deems fit as long as he is not worried that the patient will come back to sue him for negligence. In this way, a doctor can prescribe cognitive enhancers for anyone willing to pay. This relationship can be compared to the relationship of a drug user to his drug dealer. Any drug that the user wants can be purchased as long as the user is willing to pay. While the aim of allowing off-label access to medications can be seen as beneficent for the patient, furthermore the doctor and patient can practice their autonomy in deciding what would be good for the patient. The problem however with this system is that it can be and has been easily gamed. Doctors now prescribe any medication to any patient and this can be done because of the "off-label" prescription method. Patients can request any medication including addictive medications such as certain pain-killers and methylphenidate. These drugs, when not used in the right way can cause side effects, dependency or even death in some cases.

4.9 Ethical guidelines in South Africa

In South Africa, the body that supervises the medical profession is the Health Professions Council of South Africa. In order to ascertain what the current ethical framework in South Africa regarding cognitive enhancers prescribes one must look at the HPCSA guidelines.

Book 2 of the HPCSA guidelines[110] section 23(5) states: "A practitioner may prescribe or supply medicine or a medical device to a patient: Provided that such practitioner has ascertained the diagnosis of the patient concerned through a personal examination of the patient or by virtue of a report by another practitioner under whose treatment the patient is or has been and such medicine or medical device is clinically indicated, taking into account the diagnosis and the individual prognosis of the patient, and affords the best possible care at a cost-effective rate compared to other available

[110] Health Professions Council of South Africa 'Ethical and professional rules of the health professions council of South Africa booklet 2' (2016).

medicines or medical devices and the patient is informed of such other available medicines or medical devices."

It is clear from this ethical guideline that the current practice of doctors prescribing nootropics is unethical. Firstly, the doctors have not ascertained any specific diagnosis besides perhaps that the patient would like to perform better at school, work, etc. Secondly, doctors are required to adhere to the Health Professions Council of South Africa (HPCSA) guidelines, according to which methylphenidate is a highly scheduled drug to be prescribed and dispensed only under strictly controlled conditions[111]. Furthermore, the drug being prescribed is not clinically indicated as all drugs currently used as nootropics are used off-label.

It is clear from this HPCSA guideline on the prescription of drugs that such a rule still has the worldview that drugs are meant to treat a disease and not to help a patient achieve something above his or her normal capacity. The main problem with the guideline centres on the words, "clinically indicated". The HPCSA needs to take into account the modern idea of the autonomy of the patient and add the criteria of the informed competent patient being able to ask for certain drugs that he or she may wish to use.

4.10 Medical ethics and the connection to medical law

This chapter has dealt with ethics in the context of cognitive enhancers. The next chapter will deal with the law in South Africa and how it pertains to cognitive enhancers. The question to ask is whether medical ethics should inform medical law. If, as in this case where a new field that has sprung up that needs legislation, can medical ethics be followed in order to create the law or does no link such as this occur? The renowned medical law scholar stated that:
"Professional medical ethics do not stand separate from the law. Medical ethics are intrinsically interwoven with and have a continuous relationship on the doctor-patient relationship. What the rules of medical ethics demand of a physician, will at the same

[111] CA Verster and AA van Niekerk 'Moral perspectives on stimulant use by healthy students' (2012) 102(12) *South African Medical Journal* 909-11.

time and to a large extent also be the legal obligation that has to be fulfilled. It is in the medical professional field much more than in any other social relationship between men that ethical considerations are inextricably linked with considerations of a legal nature, and this is true today as it was true in the past."[112] It can thus be seen that one of the leading medical law scholars recognised the relationship between medical ethics and medical law.

Carstens opines that even though it is not always the case that what is unethical is illegal, the courts and thus the law are willing to accord an important role to ethical issues in reaching these decisions.[113] The principle that the medico-legal rules will be created in the image and follow the medical ethical rules is shown by the fact that most important ethical values i.e. life, autonomy, dignity, privacy and equality that have been included in medical ethical codes have subsequently been elevated into legal rights in some legal systems and their constitutions or human rights legislation.[114] Carstens further states that the link between medical ethics and medical law is significant since medical law is a tool for enforcing medical ethics. Law can never be an end to itself, but a means to an end.[115] Another medical legal expert, Charles Foster opines that the final end which law goes towards is to promote human flourishing to enable humans to lead excellent lives.[116]

Medicine moves at a rapid pace with new procedures, drugs and techniques becoming available in general medical practice before any moral, ethical or legal considerations can be properly assessed.[117] This is not a new phenomenon only present in the 21st century. Giesen stated the same in 1988: "… the law is not only lagging behind badly and sadly, it simply cannot keep abreast in very many instances with the legal problems that medicine is creating."[118] In order to understand what the medical law position will be one can use the medical ethical position that already exists in order to practice what will be codified in medical law at a later stage.

---

[112] D Giesen *International Medical Malpractice Law* (1988) at 669.
[113] P Carstens. Revisiting the infamous pernkopf anatomy atlas: historical lessons for medical law and ethics (2012) 18(2) *Fundamina* 23-49 at 40.
[114] Idem at 41.
[115] Idem at 44.
[116] C Foster *Human Dignity in Bioethics and Law* (2011).
[117] D Giesen (1988) at 674.
[118] Idem at 676.

4.11 Conclusion

The Google Maps analogy does not only work for distributive justice. Some commentators with dystopic futures in their vision have suggested that big companies could eventually control where a person goes by directing us there through these Map applications. However, this has not occurred doubtless because of two primary inhibiting forces. Competition from other players and legislation. Thus, Google Maps, Apple Maps, Waze and various others allow one to get from point A to point B more effectively without forcing the user to choose a specific A or B.

It can be seen that cognitive enhancers should be equally compared. They are like a map's application. By using them a person can get from A, there current state – work and knowledge – to where they would like to go, being B. Cognitive enhancers do not allow others to control the person but rather give the means to go between A and B more effectively. Allowing a person to use cognitive enhancers if they would like to is recognition of their autonomy. A doctor is able to show beneficence to their patient by giving him or her access to a drug that will help them live their best life and perform to their maximum, whether this is from a low point where the person can barely function or from a high point where the person is involved in cutting edge research and just cannot make that key breakthrough. Non-maleficence would be practised by explaining the risks and benefits of the cognitive enhancers and making sure that the patient is taken off the medication if side effects develop. Justice especially distributive justice is a key factor that could be a key determinant in a third world country like South Africa. With these drugs society potentially holds the key to allowing people to overcome genetic and social factors, allowing people to more actively engage in society, and in life by improving their cognitive functions. Making people cognitively more equal by increasing the cognition of those with the lowest is definitely just.

Understanding the medical ethics involved in the use of cognitive enhancers is essential to understanding how the medical law should be set out. The next chapter lays out the legal considerations in relation to cognitive enhancement use in adults as it currently stands and starts to develop a way forward to creating a legal framework

for cognitive enhancer use in South Africa. It will be seen that the medical law will follow closely to what has been stated in this medical ethics chapter.

Chapter 5: Legal considerations of pharmaceutical cognitive enhancer use in adults

5.1 Introduction

The previous chapter dealt with the ethical arguments related to cognitive enhancers in South Africa. It was found that there are arguments for and against the use of cognitive enhancers in South Africa. The different principles given by Beauchamp and Childress[1] were found to provide for, on ethical grounds, the use of cognitive enhancers. In this chapter, the legal position of the use of cognitive enhancers will be analysed. As was stated in the previous chapter, medical ethics and medical law are interlinked. In order to understand the societal view of cognitive enhancers, it is necessary to take ethics and the law into account.

To ascertain what the legal position of cognitive enhancers is in South Africa the relevant sections in law must be examined. The framework that will be used to do this is known as the layered-approach. This starts with the top layer which is the Constitution[2] and goes through the layers of legislation, legal books and legal opinions. In this way, it can be understood how and why the law is set up as it is. This chapter continues the journey towards creating a legal framework to allow for the access of cognitive enhancers in South Africa.

5.2. Constitution

The supreme law of South Africa is the Constitution of the Republic of South Africa, 1996 and when analysing the legal position of cognitive enhancers, it is pertinent to start with it. Section 1 of the Constitution states:

"1. The Republic of South Africa is one sovereign, democratic state founded on the following values:

[1] TL Beauchamp and JF Childress *Principles of biomedical ethics* 6 ed (2009).

[2] Constitution of the Republic of South Africa, 1996 (hereafter the 'Constitution').

(a) Human dignity, the achievement of equality and the advancement of human rights and freedoms.
(b) …
(c) Supremacy of the constitution and the rule of law".[3]

It is clear from this that the Constitution places a high value on human dignity and equality.

Below the rights that pertain to our discussion of cognitive enhancers in South Africa will be fleshed out.

5.2.1 Equality

Section 9(2): Equality includes the full and equal enjoyment of all rights and freedoms. To promote the achievement of equality, legislative and other measures designed to protect or advance persons, or categories of persons, disadvantaged by unfair discrimination may be taken.[4]

Equality is a basic and abstract idea that can be summarised as: people who are similarly situated in relevant ways should be treated similarly.[5] Cognitive enhancers have been shown to increase the cognitive abilities of those with lower intelligence. These drugs, therefore, have the ability to create a more equal society where individuals are closer to the mean of intelligence and not mere victims of genetic and socio-economic circumstances.

5.2.2 Dignity

Section 10: Everyone has inherent dignity and the right to have their dignity respected and protected.[6]

[3] Section 1 Constitution.
[4] Section 9(2) Constitution.
[5] I Currie and J De Waal *The Bill of Rights Handbook* 6 ed (2014).
[6] Section 10 Constitution.

Human dignity can be seen as central to the Constitution[7]. Perhaps the central value.[8,9] The Constitutional Court has not yet ventured to define Dignity[10], however, it has traced the origins of the value to Kantian moral philosophy, where human dignity is considered to be a persons' intrinsic worth[11]. Section 10[12] makes it clear that Dignity besides being a value and a right, is also a categorical imperative[13]. Ackerman writes that it is a supra-constitutional declaration of what the person already is.[14] Thus human dignity is not acquired from the Constitution but is rather inherent in every human being.[15] It is the source of the rights of the person to freedom and physical integrity, from which a number of other rights flow, such as the right to bodily integrity. Human dignity also provides the basis for the right to equality as all people possess dignity in equal measure, and everyone must be treated as equally worthy of respect.[16]

The Constitution is a tool and is an attempt to legally enforce the provision and maintenance of human dignity. Anything that decreases from a person's intrinsic worth can be said to go against the value of human dignity. Self-fulfilment through work increases one's self-worth and therefore the ability to work and human dignity are interlinked[17]. A person loses some of their dignity when they cannot work and must rely on handouts by the state. A person loses part of their dignity when they are unable to compete in society for resources.

---

[7] This distinguishes the South African Constitution from that of the United States which places individual liberty as the central tenet: I Currie and J De Waal (2014) at 250.
[8] Ibid.
[9] Chaskalson CJ has stated in A Chaskalson 'Human dignity as a foundational value of our constitutional order' (2000) 16 SAJHR 193 that: The affirmation of human dignity as a foundational value of the constitutional order places our legal order firmly in line with the development of constitutionalism".
[10] It has however commented on the importance of dignity. In *S v Makwanyane* 1995 (3) SA 391 (CC), the court stated that: "The importance of dignity as a founding value of the Constitution cannot be overemphasised. Recognising a right to dignity is an acknowledgement of the intrinsic worth of human beings: human beings are entitled to be treated as worthy of respect and concern" and "The rights to life and dignity are the most important of all human rights, and the source of all other personal rights in chap 3. By committing ourselves to a society founded on the recognition of human rights we are required to value these two rights above all others".
[11] L Ackerman *Human dignity: lodestar for equality in South Africa* (2014) at 98 where Ackerman agrees with this view.
[12] Constitution, 1996
[13] L Ackerman (2014) at 95.
[14] Ibid.
[15] Ibid.
[16] This distinguishes the South African Constitution from that of the United States of America which places individual liberty as the central tenet. I Currie and J De Waal (2014) at 251.
[17] L Ackerman (2014) at 108

Cognitive enhancers have the potential to allow people to increase their cognitive performance. An increase in cognitive performance whether in intelligence, attention, or concentration would lead to being able to the individual being able to work better and thus add to a person's intrinsic worth. This may be especially true for the lower, normal intelligence members of society. The use of cognitive enhancers could perhaps even allow them to work and enter broader society.

5.2.3 Freedom and security of the Person

Section 12(2): Everyone has the right to bodily and psychological integrity, which includes the right … (b) to security in and control over their body.[18]

When looking at informed consent it can be clearly seen that the Constitution itself specifically deals with the matter of a person needing permission, i.e. informed consent, before physically or psychologically interfering with another person. In regard to providing medical care to another, the medical professional must first obtain permission before interfering with a patient. Carstens states that the right to health, which is broader than a right to medical treatment, must protect a person's physical and mental well-being which includes bodily and psychological integrity.[19]
It can be seen that the Constitution makes clear provision for a person to maintain their physical integrity. If any other person wishes to interfere with that integrity he or she must first have a legal way to do so. In law, this is done using *volenti non fit injuria*,[20] where the person consents to another interfering with their physical integrity. This extends to the person having to give consent to anything that may interfere with his or her physical integrity.

The inviolability of a person has two components. These two can be seen from the two sets of words used: "security in" and "control of". In *The Bill of Rights Handbook,* Currie I and De Waal J: state that these two terms are not synonymous. They state

[18] Section 12(2) Constitution.
[19] P Carstens and D Pearmain *Foundational principles of South African medical law* (2007) at 30.
[20] *Volenti non fit injuria,* is Latin for "to a willing person, no injury is done". The doctrine holds that a person who willingly puts themselves in a dangerous situation cannot sue for any resulting injuries.

that “security in” refers to the protection of bodily integrity against intrusions by the state and others” while “control of” refers to the component of the right to be left alone so as to be allowed to live the life one chooses.

In this respect, it can be argued that a person has control of what they want to put into their bodies. This right is based on the combination of the principles of autonomy and dignity. Allowing a person to make decisions about their own body is integral to the freedom of the person.

Pharmacological cognitive enhancers are drugs that may allow people to increase their cognitive abilities. A person has the right to make decisions regarding their body and this right should include the ability to ingest a substance of which they understand the risks of use and wish to take.

5.2.4 Privacy

Section 14: Everyone has the right to privacy, which includes the right not to have—(a) their person or home searched; (b) their property searched; (c) their possessions seized; or (d) the privacy of their communications infringed.[21]

The first part of section 14 guarantees a general right to privacy.[22] It could be argued that the state can regulate the sale and purchase of cognitive enhancers, however,

[21] Section 14 Constitution.

[22] I Currie and J De Waal (2014) at 294. In *Bernstein v Bester* 1996 (2) SA 751 (CC), 1996 (4) BCLR 449 (CC) at para 73 Ackermann J stated:
‘The right to privacy consists essentially in the right to live one’s own life with a minimum of interference. It concerns private, family and home life, physical and moral integrity, honour and reputation, avoidance of being placed in a false light, non-revelation of irrelevant and embarrassing facts, unauthorised publication of private photographs, protection from disclosure of information given or received by the individual confidentially.’
Furthermore, at para 77:
‘A very high level of protection is given to the individual’s intimate personal sphere of life and the maintenance of its basic preconditions and there is a final untouchable sphere of human freedom that is beyond interference from any public authority. So much so that, in regard to this most intimate core of privacy, no justifiable limitation thereof can take place. But this most intimate core is narrowly construed. This inviolable core is left behind once an individual enters into relationships with persons outside this closest intimate sphere; the individual’s activities then acquire a social dimension and the right of privacy in this context becomes subject to limitation.’

the state must respect the privacy of citizens and leave citizens to use cognitive enhancers as they deem fit, as was found in Prince v Minister of Justice and Constitutional Development and Others regarding the use of dagga in South Africa.[23]

Any limitation of the right to privacy must be found to be reasonable and justifiable in an open and democratic society based on human dignity, equality and freedom. In the case, the high court pointed out that it is the state that bears the burden to justify any limitation that it imposes on the right to privacy.[24] Even if there are detrimental consequences of the use of such a drug such as marijuana, the state still needs to "show why a less restrictive means to achieve that purpose does not exist".[25] When dealing with cannabis the court stated that when the State considers restricting the "private act of consuming cannabis in the intimacy of a home, they should attempt to employ means of doing so which are the least restrictive of the rights being infringed. The limitation should, in other words, be narrowly tailored to achieve its purpose, should be carefully focused, and should not be overbroad."[26] The High Court and the Constitutional Court found that the use of cannabis by an adult in their private space cannot be infringed upon by the state. In determining whether the right to privacy could be infringed Zondo ACJ[27] considered the harmfulness of cannabis in relation to alcohol (a drug that is legalised for consumption by adults in South Africa). He referred to a WHO report and stated that the WHO report suggested that alcohol use is more harmful than cannabis use.[28] It can be seen that there are certain cognitive enhancers that are clearly less harmful than alcohol, i.e. Concerta (long-acting methylphenidate) and modafinil.[29] This should be kept in mind as a further reason as to why cognitive enhancers should be legalised for use by adults.

[23] *Prince v Minister of Justice and Constitutional Development; Rubin v National Director of Public Prosecutions; Acton v National Director of Public Prosecutions* 2017 (4) SA 299 (WCC).
[24] Ibid.
[25] Ibid at para 104.
[26] Ibid at para 104.
[27] *Minister of Justice and Constitutional Development v Prince (Clarke and Others Intervening); National Director of Public Prosecutions v Rubin; National Director of Public Prosecutions v Acton* 2018 (6) SA 393 (CC) at para 70.
[28] World Health Organisation 'The health and social effects of nonmedical cannabis use' (2016) at 23.
[29] See clinical chapter.

5.2.5 Healthcare, food, water and social security

Section 27(1): Everyone has the right to have access to— (a) health care services, including reproductive health care;
(2) The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights.

Health care is a basic right that must be upheld by the state. The state needs to roll out such healthcare based on the resources available. Policy considerations decide what is part of healthcare and therefore what needs to be provided for by the state. The current argument around cognitive enhancers leads to the debate as to whether they are a medical necessity and therefore must be provided for by the state or a luxury in which case it should be argued that private citizens should have to foot the bill for the purchase of them.

5.2.6 Children

Section 28(2): A child's best interests are of paramount importance in every matter concerning the child.[30,31]

Whenever considering the child it must be taken into account what would be best for the child and act accordingly. It is thus incumbent upon society to set up legislation allowing for children to use cognitive enhancers if it would benefit them and under the correct supervision, taking into account that they also have a certain amount of autonomy based on their age and maturity.

5.2.7 Interpretation of the Bill of Rights

[30] Section 28(2) Constitution follows the lead set by international instruments such as art 3 of the United Nations Convention of the Rights of the Child UN Doc. A/RES/44/25 (1989), and art 4 of the African Charter of the Rights and Welfare of the Child OAU Doc. CAB/LEG/24.9/49 (1990).
[31] I Currie and J De Waal (2014) at 620 state that s 28(2) is not only a guiding principle but also a right in and of itself. This right also strengthens other rights such as the right to access health care. See further *Treatment Action Campaign v Minister of Health* 2002 (4) BCLR 356 (T).

Section 39: (1) When interpreting the Bill of Rights, a court, tribunal or forum— (a) must promote the values that underlie an open and democratic society based on human dignity, equality and freedom; (b) must consider international law; and (c) may consider foreign law. (2) When interpreting any legislation, and when developing the common law or customary law, every court, tribunal or forum must promote the spirit, purport and objects of the Bill of Rights.

This section allows us to use international law together with the fundamental rights of dignity, equality and freedom to create legislation for the use of cognitive enhancers.

5.3. Legislation

The legislative framework that is currently in place is the next part that must be looked at in connection with nootropics. The automatic place to look at is the legislation concerning pharmaceuticals and prescriptions.

5.3.1 Legislation pertaining to medicines and drugs

5.3.1.1 Medicines and Related Substances Act 101 of 1965 (as amended)

This legislation is the Medicines and Related Substances Act (MRSA) 101 of 1965. The focus will be on what this Act states regarding the three main drugs currently used off-label[32] as nootropics, these being: methylphenidate, modafinil and amphetamine. The definition given for medicine in the MRSA is:

"medicine" - means any substance or mixture of substances used or purporting to be suitable for use or manufactured or sold for use in -

(a) the diagnosis, treatment, mitigation, modification or prevention of disease, abnormal physical or mental state or the symptoms thereof in man; or

[32] The term 'off-label' means that the medicine is used in another way or for an indication other than the ones specified in the conditions of registration of the medicine and as reflected in its labelling: RM Jansen 'The off-label use of medication in South Africa – what about some information for medical practitioners?' (2009) 99(6) *SAMJ* 438.

(b) restoring, correcting or modifying any somatic or psychic or organic function in man, and includes any veterinary medicine.[33]

The wording here talks about different aspects of combatting disease in (a). In (b) the wording refers to function but again talks about restoring, correcting or modifying. It could be argued that “modifying” includes “enhancing” however the context in which the term is used and the fact that modification is used in (a) in connection with disease shows that this is not the intended use of the word but rather to denote a modification to treat or prevent disease. Thus, in the definition of “medicine”, there is no part that caters for medicine to be used as an enhancer.

With regard to the legislation it is key to understand who may prescribe these drugs.

Section 22A(5) states: Any Schedule 2, Schedule 3, Schedule 4, Schedule 5 or Schedule 6 substance shall not be sold by any person other than-
(d) a medical practitioner or dentist, who may-
(i) prescribe such substances.[34]

Thus, it can be seen that the law strictly permits only a doctor or dentist to prescribe the drugs that act as cognitive enhancers.[35] The burden thus falls on these medical practitioners to decide whether they are willing to prescribe these drugs “off-label” for patients that wish to use them.

It should be understood in which circumstances doctors are allowed to prescribe such drugs. In this regard section 22A(17) states:
'medicinal purpose' means for the purposes of the treatment or prevention of a disease or some other definite curative or therapeutic purpose…”.[36]

[33] Section 1(1) MRSA at ‘medicine’.
[34] Section 22A(5) MRSA.
[35] See clinical chapter. Methylphenidate is a schedule 6 substance while modafinil is classified as a schedule 5 substance.
[36] Section 22A(17) MRSA.

It is clear from this legislation that the medicinal purpose of a drug is to treat or prevent disease. Nootropics are used for their cognitive-enhancing effects as to enhance is defined as "to improve the quality, amount or strength of something".[37] They would not be allowed to be prescribed as they can be said to have no 'medicinal' value for such patients.

Medical practitioners are prescribing nootropics to patients and yet such practice is clearly illegal as stated in the legislation:

Section 22(A) - "Notwithstanding anything to the contrary contained in this section, no person shall sell or administer any Scheduled substance or medicine for other than medicinal purposes".[38]

The MRSA further states in section 29 'Offences' that:
"(k) Any person who contravenes any provision of section 22A, 22C(5) and (6), 22F, 22G or 22H or contravenes or fails to comply with any condition imposed thereunder; shall be guilty of an offence".[39]

In Section 30, titled Penalties it goes on to state:
"(1) Any person who is convicted of an offence referred to in section 29 shall be liable to a fine, or to imprisonment for a period not exceeding 10 years".[40]

Thus, medical practitioners who prescribe and continue to prescribe these drugs illegally should be subjected to a fine or imprisonment. Given how widespread the prescription of these drugs is it is trite to say that many medical professionals, out of the already limited number of medical professionals working in South Africa, could face jail time for prescribing cognitive enhancers to patients.

[37] C McIntosh (ed) *Cambridge advanced learner's dictionary* 4 ed (2013).
[38] Section 22A MRSA.
[39] Section 29 MRSA.
[40] Section 30 MRSA.

In order for a pharmaceutical product to be used in South Africa, it must be registered for a specific purpose/s with the SAHPRA[41]. This Body must follow the law regulating pharmaceutical use and prescription as set out in the MRSA. Due to the fact that the nootropics that are available are all actively used in the treatment of other diseases, they too are controlled by the aforementioned body and legislation. The criteria for medical practitioners to prescribe these drugs is thus dictated by the SAHPRA.

In order to allow for cognitive enhancers to be available to the general public without the prescription requirements defined in the MRSA, a rescheduling of these drugs would have to occur. Section 37A of the Act specifies that this can be done and defines how it should be done. It states:

"Notwithstanding the provisions of section 35(2), the Minister may, on the recommendation of the council, from time to time, by notice in the Gazette amend any Schedule prescribed under section 22A (2) by the inclusion therein or the deletion therefrom of any medicine or other substance, or in any other matter".[42]

This shows that the Minister has the power to change the schedule of any substance as would be the case in order to allow cognitive enhancers to be bought at storefronts.

In order to fully understand how medicines and drugs are regulated in South Africa another piece of legislation that needs to be examined is the Drugs and Drug Trafficking Act 140 of 1992 (DDTA). If cognitive enhancers are to be made legal then this Act needs to be examined as Adderall is currently one of the drugs that it controls.

5.3.1.2 Drugs and Drug Trafficking Act No 140 of 1992

[41] Formerly known as the Medicines Control Council (MCC), the MRSA gives the SAHPRA the power to cause any medicine to need registration in terms of the act and to determine what class the medicine shall be classified as. Section 14(2)(A) of the Act states:
The council may from time to time by resolution approved by the Minister, determine that a medicine or class or category of medicines or part of any class or category of medicines mentioned in the resolution shall be subject to registration in terms of this Act.
[42] Section 37A MRSA.

The purpose of the DDTA is to provide for the prohibition of the sale, acquisition or manufacture of drugs.[43] This legislation should be read with the MRSA as they both deal with substances.

The DDTA places substances into different categories depending on how dangerous the substance is. The danger is based on the dependence-producing effect of the drug as well as the side effects of the drug. Schedule 2, Part III of the Act is titled Undesirable Dependence-Producing Substances, from which it can be seen that the substances Amphetamine and Cannabis are included in this category.[44] The use of such substances carries the punishment of jail terms.[45] The problem is that the act purports to classify substances based on dependence causing effects, yet alcohol and nicotine do not make an appearance on any of the schedules. The fact that these two substances, which are clearly dependence causing drugs that cause much harm in society, are missing indicates that there is a problem in the way that the scheduling of drugs occurs.

5.3.1.3 Scheduling of substances

The scheduling of substances allows for different regulatory control levels over pharmacologically active substances. This is whether they are in the form of pharmacologically active ingredients, naturally-occurring products or extracts thereof, or finished pharmaceutical products (medicines). The primary consideration in scheduling a substance is its safety profile, and the requirements for professional advice and or supervision, in relation to the therapeutic indications for its use.[46] Substances may be listed in one or more of the eight schedules. The schedules increase from schedule 0 being seen as the safest substances to schedule 8, which

[43] Long title DDTA. The definition of a drug in this Act should be kept in mind. A **"**drug" is defined in the DDTA at s 1 as any dependence-producing substance, any dangerous dependence producing substance or any undesirable dependence-producing substance.
[44] Schedule 2 Part III DDTA. In the repealed Abuse of Dependence-Inducing Substances and Rehabilitation Centres Act 41 of 1971, this category was titled "prohibited drugs".
[45] Read section 4 together with section 13 and 17
[46] Medicines Control Council 'Scheduling of medicines: guidelines' (2014) at 12 states that the safety profile is derived from the toxicity of the substance and the safety of its use together with the potential for abuse of the substance.

are considered to be the most dangerous substances.[47] These schedules allow South Africa to comply with its obligations in terms of the Single Convention on Narcotic Drugs (1961), the Convention on Psychotropic Substances (1971) and the United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances (1988), to which it is a signatory.

The scheduling of such substances can, therefore, be seen as having serious consequences. The substance schedule status will determine how the drug may be marketed, who it may be marketed to and where it may be purchased from. The scheduling of substances also dictates how users of drugs and substances are treated when in possession of them. Whereas a schedule 0 medicine can be purchased from any store,[48] schedule 1 and 2 substances may only be purchased from a pharmacy,[49] while schedule 3 and above substances further require that the patient has received a prescription for the medicines.[50] Furthermore, only schedule 0 and schedule 1 drugs may be advertised to the public whereas drugs in other schedules may only be marketed to doctors.[51] Given that the scheduling of drugs has such consequences it could be assumed that the research that occurs behind the scenes in order to ascertain the safety profile of such drugs would be thorough.

It has been argued that such is not the case[52]. In fact, drug scheduling within the international system of drug control and national legislation has been criticised as having a lack of scientific evidence.[53] Some experts, such as Fischer and Kendall, believe that drug policy: "which persists today, had neither public health, nor pharmacology, nor any attempt of rigorous harm quantification as a foundation."[54] Dubljević opines that the current prohibition regime is too harsh and costly and needs

[47] Ibid.
[48] Section 22A (3) MRSA states: "Any schedule 0 substance may be sold in an open shop".
[49] Ibid Sections 22A(4) and (5).
[50] Ibid Section 22A(5).
[51] Medicines Control Council (2014).
[52] D Nutt et al 'Development of a rational scale to assess the harm of drugs of potential misuse' (2007) 369(9566) *Lancet* 1047–53.
[53] V Dubljević 'Toward an improved multi-criteria drug harm assessment process and evidence-based drug policies' (2018) 9 *Frontiers in Pharmacology* 898.
[54] B Fischer and P Kendall 'Nutt et. al.'s harm scales for drugs – room for improvement but better policy based on science with limitations than no science at all' (2011) 106(11) *Addiction* 1891–2.

to be changed, especially in cases of harmless drugs and substances. He believes that the problem is how to establish transparent, evidence-based criteria about which drugs and substances are "relatively harmless".[55] This debate concerning drug policies has discredited the prohibitive policies currently in use.[56] In South Africa, SAHPRA is the official body charged with overseeing and regulating medicines.[57] When a pharmaceutical is placed into a specific schedule it is done by the Minister of Health at the recommendation of the MCC.[58] Yet, there are no records of these recommendations or what research was used to arrive at them. Only the end result is seen, which is the schedule that the drug is placed into. This system is neither transparent nor does it allow for the scientific community to assess the data on which the decision is based and attempt to replicate the findings.

In order to replace a system that is broken requires a tool that can help to classify drug safety based on scientific evidence. A tool that has been proposed by Nutt et al is the Multi-Criteria Drug Harm Scale (MCDHS).[59] The idea behind the scale is that expert rating panels together with consensus workshops can supply information on the harm from drug and substance abuse. The scale offers a systematic framework and process that can be used by different bodies to assess the harm of current and future drugs.[60] The harmfulness ratings produced by this system has been found to differ markedly from the assumptions of most regulatory systems.[61] The advantages of this system are that a large body of knowledge is able to be systematised in a transparent manner, which allows for replication and improvement of the scale[62]. The key areas here are the transparency and replication of the system, two things that current systems do not cater for.

[55] V Dubljević (2018).
[56] D Nutt et al (2007).
[57] Section 2 MRSA.
[58] Section 22A(2) MRSA.
[59] D Nutt et al (2007) 1047–53.
[60] Ibid.
[61] J Van Amsterdam et al 'Ranking the harm of alcohol, tobacco and illicit drugs for the individual and the population' (2010) 16(4) *European Addiction Research* 202–7.
[62] V Dubljević (2018) at 3.

The MCDHS is mentioned here to show that there are other systems that are being put forward to try and replace what is seen as a broken and arbitrary system of medicine scheduling. In the previous section, it was mentioned that the scheduling of drugs in South Africa, in some instances appears to be arbitrary. Cannabis and amphetamines are placed in Schedule 2 of the Drugs and Drug Trafficking Act,[63] while ethanol and nicotine are nowhere to be seen. Furthermore, if one looks at the scheduling of prescription drugs then there are bizarre decisions that have been made. Modafinil is a controlled schedule 5 substance, yet it has only modest side effects,[64] very low rates of toxicity and its risk of mortality seems to be zero or very close to that.[65] Modafinil did not exist when the United Nations Convention on Psychotropic Substances was created in 1971 which has led to a situation where countries, including South Africa, have arbitrarily decided whether to make modafinil a controlled substance or not. An examination of the reasoning behind this scheduling is not possible as the process was not documented, and reasons were not put forward.[66]

The aim here is to show that the scheduling of drugs is not purely based on scientific evidence and therefore should not be seen as written in stone. The fact that at the moment methylphenidate and modafinil are viewed as highly scheduled substances

[63] Schedule 2 DDTA.

[64] FDA Approved Labelling. Provigil (Modafinil) tablets 17 August 2007. (Accessed on 19 October 2018) https://www.accessdata.fda.gov/drugsatfda_docs/label/2007/020717s020s013s018lbl.pdf.

[65] H Bastuji and M Jouvet 'Successful treatment of idiopathic hypersomnia and narcolepsy with modafinil' (1988) 12(5) *Progress in Neuro-Psychopharmacology and Biological Psychiatry* 695–700 report on a hypersomniac who attempted suicide via ingestion of 4,500 mg modafinil (45 times the usual single dose). She suffered only an increased heart rate and 24 hours of nervousness, nausea, and insomnia prior to a full recovery.

[66] V Dubljević 'Enhancing with modafinil' in F Jotterand and V Dubljević (eds) *Cognitive enhancement: ethical and policy implications in international perspectives* (2016). In order for a medicine to be classified as schedule 1 the medicine must be found to have:

- A low and well-characterised rate of adverse effects
- The risk profile of the medicine is well defined and the risk factors can be identified and managed by a consumer through appropriate packaging and labelling and access to consultation with a health professional if required
- Safe and effective use of the medicine can be achieved by labelling, packaging, and/or provision of other information, with access to advice from a pharmacist.

All of these criteria are met by Modafinil which begs the question as to why it should be a schedule 5 substance. See further:
A Rathi 'The world's first true smart drug enhances cognition and is deemed safe by health experts' available at: https://qz.com/485020/the-worlds-first-true-smart-drug-enhances-cognition-and-is-deemed-safe-by-health-experts/ (accessed on 19 October 2018); J Fabiano 'Cognitive enhancement, legalising opium, and cognitive biases' available at: http://blog.practicalethics.ox.ac.uk/2014/11/cog_enhancement_biases/ (accessed on 19 October 2018).

and amphetamine is an illegal substance should not prevent us from investigating what the true ramifications would be of such use in wider society were they to be made legal and available for cognitive enhancement use. Such re-examination should be done on a national and international level using a method such as the MCDHS which is a tool that is both transparent and replication of the findings is possible. This would allow medicines to be placed in the correct schedules and for the public to understand the logic behind the scheduling of substances.

5.3.2 Medical Innovations Bill

However, let us see if perhaps there is hope on the horizon and some reform in sight. Perhaps it can be found in the form of the "Medical Innovations Bill" which has been introduced in the National Assembly and published in the Government Gazette in 2014.[67] This proposed piece of legislation could further the cause of nootropics. It attempts to, as its preamble states,

"make provision for innovation in medical treatment…".

The major reason for this piece of legislation is clearly for its legalization of medical professionals to be able to prescribe cannabinoids to patients.[68] If it is to be used to legalize cannabinoids, a substance that has been illegal for nearly a century then surely it can show us a way to legalize nootropics, substances that have been shown to actually enhance, for prescription purposes.

In section two of the Bill, it states:
"The purposes of the Act are to –
(1) codify existing best practices as to decisions by medical practitioners to innovate in cases where evidence-based treatment or management is not optimal or appropriate because the available evidence is insufficient or uncertain;
(2) …

[67] Medical Innovations Bill (GG37349) (2014).
[68] A Viljoen 'Dagga medicine legal by April?' https://www.news24.com/SouthAfrica/News/dagga-medicine-legal-by-april-20161124 (accessed on 17/10/2018).

(3) encourage responsible innovation in medical treatment and management by supporting reasonable and logical clinical decisions".[69]

It is clear from these purposes that the Bill is an attempt to allow medical practitioners to innovate in the medical field, a field which has notoriously been very slow to allow any innovation to be used.

However, the Bill falls short. It talks about innovation but it itself does not wish to innovate on the language used to describe medication given to patients, it uses an archaic definition of a "condition", as the bill states:[70]

"shall mean a medical condition which, if not cured, may cause the patient's death or severe impairment to his or her medical condition or quality of life."

Or the term "treatment":[71]

"shall include, without limitation, actions prescribed by a medical practitioner aimed at curing, managing, ameliorating or treating a condition or inaction."

It can be seen from the wording of "condition" and "treatment" that there is no room for enhancers to be made available for prescription to the public. In order to allow for cognitive enhancers, amendments would need to be made to the acts listed above firstly defining enhancers and then outlining how they can be prescribed, advertised and used.

There are two drugs in the public domain that will help to ascertain what is needed to allow cognitive enhancers to be made available to the public. These drugs are Alcohol and Tobacco. The method in which these drugs have been regulated will point us to a path as to how to set up a framework for cognitive enhancers to be made available for public use in South Africa.

[69] Section 2 Medical Innovations Bill.
[70] Section 1 Medical Innovations Bill.
[71] Section 1 Medical Innovations Bill.

In order to be able to allow for cognitive enhancer use in South Africa, especially if such is to be done on a large scale the following would also have to be regulated for cognitive enhancers:

- Sale of cognitive enhancers to persons of age 18 or older;
- Advertising of cognitive enhancers;
- What can be put on the packaging of cognitive enhancers?

5.3.3 Informed consent in adults

Informed consent must be given by the user before any cognitive enhancers can be supplied to such user. It is important to thus understand what is required in terms of the legislation with regards to obtaining informed consent in adults.

The National Health Act 6 of 2003 defines what is meant by informed consent and it must be examined to understand what is meant by consent. Section 6 of the Act states: "6. User to have full knowledge – (1) Every health care provider must inform a user of –

(a) the user's health status except in circumstances where there is substantial evidence that the disclosure of the user's health status would be contrary to the best interests of the user;
(b) the range of diagnostic procedures and treatment options generally available to the user;
(c) the benefits, risks, costs and consequences generally associated with each option; and
(d) the user's right to refuse health services and explain the implications, risks, obligations of such refusal.

(2) The health care provider concerned must, where possible, inform the user as

contemplated in subsection (1) in a language that the user understands and in a manner which considers the user's level of literacy".[72]

It can be seen from the above section that it explicitly details exactly what information the healthcare provider needs to give to the user in order for the user to be able to give informed consent or informed refusal to the healthcare provider. Section 6 is titled "User to have full knowledge", which makes it clear that for the user to have full knowledge he or she has to be given the necessary facts as set out in section 6.

5.3.4 Tobacco Products Control Act 83 of 1993

The Tobacco Products Control Act (TPCA) was promulgated in order to control tobacco use in South Africa.[73] The description gives us a broad definition as to exactly what needs to be regulated. The description of the Act states:

"To prohibit or restrict smoking in public places; to regulate the sale and advertising of tobacco products in certain respects and to prescribe what is to be reflected on packages; and to provide for matters connected therewith."

The preamble indicates that the legislators understand that some practices by society, such as tobacco use, are inappropriate to ban but should still be discouraged. The preamble states:[74]

> "… harmful effects of the use of tobacco products on health calls for strong action to deter people, especially the youth, from using tobacco products, to protect non-smokers from exposure to tobacco smoke and to encourage existing users of tobacco products to quit; …"

[72] Section 6 National Health Act.

[73] MC Buthelezi and M Reddi 'The framework convention on tobacco control measures: does South Africa measure up?' (2003) 28(2) *Journal for Juridical Science* 175-198 opine that the restrictions impact on certain fundamental rights. The conflict occurs between the right to life and the right to free enterprise. Those that defend the latter will view any restrictions as a threat to their right to freedom of trade. It is shown that given the negative effects of smoking on a person's right to life it is justifiable to curtail the tobacco manufacturer's right to trade in order to protect the consumer. After all, without life there would be no need for any of the other rights.

[74] Preamble TPCA.

Given the state of cognitive enhancer use, society could allow for a similar path with cognitive enhancers. This would still allow for individuals to have the autonomy to decide for themselves whether to use cognitive enhancers.

Section 4 of the Act titled: Prohibitions in respect of tobacco products states:

(1) No person shall sell or supply tobacco product to any person under the age of 18 years.

(2) The owner or person in charge of any business shall ensure that no person under the age of 18 years in his or her employ or under his or her control, as the case may be, shall sell or offer to sell any tobacco product on the business premises.[75]

It can be seen that tobacco products are only to be sold to those of 18 years of age or older. This makes subsection 2 necessary as an underage person who has control of the stock could make private use of it. The terms here would apply in same to cognitive enhancers which could be purchased freely by those over the age of 18.

Part of section 4 deals with being able to sell tobacco products via the internet.

- No person shall sell, offer to sell, supply, distribute or buy any tobacco product through the postal services, the internet or any other electronic media.
- The prohibition contained in paragraph *(a)* does not apply to any commercial communication between a tobacco manufacturer or importer and its trade partners, business partners, employees and shareholders.[76]

Tobacco products may not be sold or supplied to the consumer via electronic media. The same should be applied to cognitive enhancers as the consumer should come into a store to purchase. This would prevent anyone under the age of 18 from freely being able to purchase cognitive enhancers over the internet.

[75] Section 4 TPCA.
[76] Section 4(5).

Tobacco products may not be advertised in South Africa.[77] It is proposed that the same treatment should be given for cognitive enhancers. In order to ascertain how such would be handled it first needs to be looked at how advertising is handled in the Tobacco act:

In section 1 of the Tobacco Products Control Act 83 of 1993, titled definitions, advertisement is defined as:

'advertisement', in relation to any tobacco product-

(a) means any commercial communication or action brought to the attention of any member of the public in any manner with the aim, effect or likely effect of- (i) promoting the sale or use of any tobacco product, tobacco product brand element or tobacco manufacturer's name in relation to a tobacco product; or (ii) being regarded as a recommendation of a tobacco product;

(b) includes product placement; and

(c) excludes commercial communication between a tobacco manufacturer or importer and its trade partners, business partners, employees and shareholders and any communications required by law, and **'advertise'** has a corresponding meaning;[78]

'promotion', in relation to any tobacco product-

is the practice of fostering awareness of and positive attitudes towards a tobacco product, brand element or manufacturer for the purposes of selling the tobacco product or encouraging tobacco use, through various means, including direct advertisement, incentives, free distribution, entertainment, organised activities, marketing of brand elements by means of related events and products through any public medium of communication including cinematographic film, television production, radio production or the internet, and **'promote'** has a corresponding meaning;[79]

[77] MC Buthelezi and M Reddi (2003) state that the preamble of the amended Act recognises that advertising may have the harmful effect of encouraging people to take up smoking. In an attempt to protect the vulnerable, Section 3 of the amended Act banned advertising of tobacco products.
[78] Section 1 TPCA at 'advertisement'.
[79] Ibid at 'promotion'.

Section 3 titled: Advertising, sponsorship, promotion, distribution, display and information required in respect of packaging and labelling of tobacco products. This section deals with all aspects related to these topics. Each subsection will be examined to identify what must be used in respect of cognitive enhancers.

(1) *(a)* No person shall advertise or promote, or cause any other person to advertise or promote, a tobacco product through any direct or indirect means, including through sponsorship of any organisation, event, service, physical establishment, programme, project, bursary, scholarship or any other method.[80]

Tobacco is a controlled substance and therefore the law does not allow tobacco manufacturers to advertise this product in order to try and entice consumers to buy the product.[81] The government was ruled to have the power to ban one-on-one advertising and promotion of tobacco products.[82]

The same method should be used for cognitive enhancers. The aim of the law with respect to cognitive enhancers should be to allow people to have the choice if they wish to purchase such. However, society should not try and create a dystopian environment where it actively encourages all citizens to enhance. This, in any case, would lead to the subtle undermining of people's autonomy which would be unacceptable due to the sometimes-unproven effects of cognitive enhancers.

(2) No manufacturer, importer, distributor or retailer of tobacco products shall-

[80] Section 3(1)(a) TPCA.

[81] MC Buthelezi and M Reddi (2003) state that as a result of the ban that took place all advertisements for tobacco products ceased and were replaced by health warnings by the relevant departments of health in South Africa. Most of the messages were aimed at trying to encourage existing smokers to stop smoking.

[82] *British American Tobacco South Africa (Pty) Ltd v Minister of Health* [2012] All SA 593 (SCA). British American Tobacco (BAT) was concerned that the definitions of advertisement and promotion would prohibit one-on-one communication with existing adult consumers. BAT contested that this limited a consumer's right in terms of s 16 to both impart and receive commercial speech. The court found that there are ill effects of tobacco use and public health considerations. Furthermore, South Africa has an obligation under art 13 of the Framework Convention on Tobacco Control, which also requires a ban of all tobacco advertising, promotion and sponsorship: para 23. The limitation in terms of s36 of the Constitution, which allows for the limitation of a right was therefore found to be justified. The concurring judgement of Farlam JA focused on what s 3(1)(a) does permit. He interprets the phrase 'brought to the attention of' in the definition of 'advertisement' to mean that 'the activity prohibited is the taking of the initiative in making the communication …' This interpretation signals that a member of the public may ask for information and then receive such information, however, the tobacco companies may not initiate any contact with the consumer.

(a) organise or promote any organised activity that is to take place in whole or in part in the Republic;

(b) make any financial contribution to any organised activity that is to take place, or is taking place, or has taken place in whole or in part in the Republic;

(c) make any financial contribution to any person in respect of-

(i) the organisation or promotion of any organised activity in the Republic by that person;

(ii) the participation, by that person, in any organised activity that is to take place, or is taking place in whole or in part, in the Republic.[83]

This subsection specifically deals with the sponsorship of events. This is another form of advertising that companies undertake in order to make their brand known to members of society. As with tobacco, cognitive-enhancing manufacturers should not be allowed to actively sponsor an event or activity in order to advertise themselves as this will cause positive associations between the drug and the sponsored event. The aim of the legislation for tobacco and what this thesis wishes to accomplish is to remove this link and only allow for use of cognitive enhancers from one's own free will.

(3) A manufacturer or importer of a tobacco product may make a charitable financial contribution or sponsorship, provided that such contribution or sponsorship is not for the purpose of advertisement.[84]

This subsection merely allows a company to make charitable donations or sponsorship as long as such donations or sponsorship is not for the purpose of advertising a brand to the consumer.

(6) No person shall package or label a tobacco product in any way that is false, misleading, deceptive or likely to create any erroneous, deceptive or misleading impression about its characteristics, properties, health effects, toxicity, composition,

[83] S 3(2) TPCA.
[84] S 3(3) TPCA.

merit, safety, hazards or emissions, including any term, descriptor, trademark, figurative or other sign that directly or indirectly creates the impression that a particular tobacco product is less harmful than another tobacco product.[85]

This subsection is crucial as it prohibits the falsification of the risks involved with smoking from the packaging of the tobacco product. Cognitive enhancers do have some risks. Even though these risks have been shown to be mild,[86] they may still occur and as such the labelling and packaging of the cognitive enhancer should clearly state such.

(7) No person shall manufacture for sale in the Republic, import for subsequent sale or sell a tobacco product-

(a) unless the tobacco product is packaged in the prescribed manner; and

(b) in a package or containing a label that contains false or misleading information or that is calculated to deceive the user of such product.[87]

This subsection prevents the manufacturer from designing the packaging with anything misleading on it or from creating the packaging with anything differing from the standards prescribed. Cognitive enhancers would also need to have standard packaging that prevents the consumer from buying one cognitive enhancer over another merely because the packaging is more appealing.

(8) A wholesaler shall display a tobacco product at his or her place of business in the prescribed manner.[88]

This subsection deals with creating regulations for tobacco products as to exactly where and how they should be placed. Cognitive enhancers would also need to be

[85] S 3(6) TPCA. MC Buthelezi and M Reddi (2003) opine that the compulsory labelling of cigarette packages with health warning messages and information relating to nicotine and tar contents has secured the rights of consumers to their constitutional right of access to information. Consumers have the right to know the risks that they are exposed to when using a product. This allows them to exercise their informed consent to either use or not use a product.
[86] Refer to clinical chapter.
[87] S 3(7) TPCA.
[88] S 3(8) TPCA.

placed behind shop counters in a specific area in order to control the sale and appeal of said enhancers.

(9) A retailer shall display-

> *(a)* a notice in the prescribed manner in his or her place of business that contains the prescribed information regarding any tobacco product available at his or her place of business; and
>
> *(b)* a tobacco product at his or her place of business in the prescribed manner and in such a way that no person shall be able to handle the tobacco product before paying for it.[89]

This subsection firstly details the information required to be displayed by the seller of tobacco. With regards to cognitive enhancers, there should be a sign on the premises which is clearly visible that consumers may gather the relevant information in order to make an informed decision in respect to purchasing a cognitive enhancer. The second part deals with the prohibition of allowing the consumer to handle the tobacco product before purchase. Again, this subsection attempts to prevent the consumer from being influenced by the packaging of the product. The same should be true for cognitive enhancers. The consumer should want the enhancer and not be influenced into buying an enhancer or a specific type merely because of the feel or up-close look of the packaging.

(10) No person shall sell or offer to sell tobacco products at retail, unless the prescribed notices are displayed.[90]

This is merely a further warning that subsection 9(1) must be adhered to.

5.3.5 National Liquor Act 59 of 2003

Another substance that is publicly consumed in large quantities is alcohol. Let us now see which parts of the National Liquor Act 59 of 2003 (NLA) could be applicable to a Cognitive Enhancer legal framework.

[89] S 3(9) TPCA.
[90] S 3(10) TPCA. The subsections not dealt with above have been repealed.

Section 9 of the Act, which is titled ‘Advertising Restrictions’, states:

(1) A person must not advertise –
    (a) any liquor or methylated spirits –
        (i) in a false or misleading manner;
        (ii) in a manner intended to target or attract minors; or
    (b) any substance that is prohibited in terms of this Act.
(2) A person must not advertise any substance as liquor or methylated spirits if that substance is not liquor or methylated spirits, respectively, as defined in this Act.[91]

The Act thus states that advertising of liquor or methylated spirits may be done, but only if such is done with true information and if such does not target or attract minors.[92] This is because the advertising of alcoholic beverages is currently legal in South Africa (as of 9 August 2018). This is in contradistinction to tobacco which may not be advertised in any form. Thus, it can be seen that there are two different approaches to how a controlled substance should be advertised. In the case of cognitive enhancers, it is proposed that such advertising be prohibited due to the manipulative element of it.

Section 10 titled ‘Prohibition of supply of liquor or methylated spirits to minor’ gives us information as to when it is permissible to give liquor to a minor.

(1) A person must not sell or supply liquor or methylated spirits to a minor.[93]

This subsection, as with tobacco prevents the supply or sale of alcoholic products to a minor.

(2) Despite subsection (1), the parent, adult guardian of a minor or a person responsible for administering a religious sacrament, may on occasion supply

[91] S 9 NLA.
[92] A ‘minor’ is defined in the NLA at s 1(1) ‘minor’ as ‘a person who has not attained the age of 18 years’.
[93] S 10(1) NLA.

to that minor a moderate quantity of liquor to be consumed by the minor in the presence and under the supervision of that parent, guardian or other person.[94]

This section is of import as it allows the parent or guardian to supply liquor to a minor if it is for religious purposes. Such circumstances occur in the Christian and Jewish faiths. Such a subsection shows the way for a subsection where a parent or guardian may purchase and provide cognitive enhancers for a minor. Even though this would not be for religious purposes this subsection shows that it is possible to allow the parent to determine and be responsible for allowing the minor to consume a normally prohibited substance.

(3) A person must take reasonable measures to determine accurately whether or not a person is a minor, before selling or supplying liquor or methylated spirits to that person.[95]

This subsection merely entails that a drivers licence or other such proof of age ID, passport, etc. should be produced to adequately show the age of the person purchasing the alcoholic beverage. The same would apply to the purchase of cognitive enhancers.

(4) A minor must not make a false claim about age in order to induce a person to sell or supply liquor or methylated spirits to him or her.

(5) A person must not make a false claim about the age of a minor in order to induce a person to sell or supply liquor or methylated spirits to the minor.

(6) A minor must not –

(a) produce liquor;

(b) import liquor; or

(c) supply liquor to any other person.[96]

Subsections 4-6 are self-explanatory. They would also be needed with respect to cognitive enhancers.

[94] S 10(2) NLA.
[95] S 10(3) NLA.
[96] S 10(4)-(6) NLA.

The relevant legislation on controlled substances has shown the way in advertising, sale to over 18's, how the packaging should be arranged and when the customer should be allowed to touch the product. By combining what is already in effect it is possible to create legislation for cognitive enhancers. Legislation must fulfil the principles of ethics that have been spoken about in the ethical chapter. A leading light in the proposal of regulation and legislation regarding cognitive enhancers is Dubljević. It is to his work that this thesis shall now turn.

5.4. Further considerations in creating the legislation

5.4.1 Lack of regulation

The first thing to consider is why new regulation is needed in the first place. If one is to consider the current state of affairs as described previously it should be easy to see that the situation is not one that can be allowed to carry on. The clinical chapter shows that cognitive enhancer use is on the rise. Without the relevant legislation, there would be a situation where the legal implications of the use of cognitive enhancers mean most cases breaking the law. As mentioned previously there is a case to be made that at present doctors are illegally prescribing scheduled medication to patients that do not qualify for such and thus the doctors should be penalised. Furthermore, Dublejević states that a lack of adequate regulation could lead to the widespread violation of rights and justice. He further states that in the military and education there would be acute pressure to enhance. However, the biggest cause of indirect and direct coercion may result from corporations performing utility calculations as to the enhancement of their employees.[97] Without regulation, there is a possibility that there will be no law preventing companies from such coercion and no recourse for the parties that are subjected to such coercion to seek legal recourse.

There is currently no adequate piece of legislation that even attempts to define enhancers, the use of enhancers, and the fines to be imposed on those who abuse enhancers and this needs to be rectified.

[97] V Dubljevic 'Towards a legitimate public policy on cognition-enhancement drugs' (2012) 3(3) *AJOB Neuroscience* 29–33 at 30 (hereafter 'V Dubljevic (2012)(1)').

5.4.2 Public policy of cognitive enhancers

When considering the different policies that may be used in the control of cognitive enhancers, one should first ascertain what kind of policies have been put forth before choosing one that may work for the South African environment. The ideas set out by Dubljević in his various writings will be heavily relied upon.[98] Dubljević opines that there are different routes that regulation can be set. It could be banned for healthy individuals as it currently is - prohibition. It could be made available in a laissez-faire style where anybody and everybody is allowed to purchase cognitive enhancers as is the case today with the purchase of caffeinated drinks. He believes that a middle-ground approach is called for to take into account the pro-enhancement and anti-enhancement groups. The policies that will be discussed below are laissez-faire, prohibition, coffee-shop (Amsterdam), gatekeeper, and economic disincentives model.

5.4.2.1 Laissez-faire

Laissez-faire means "the policy of leaving things to take their own course, without interfering".[99] This is the most liberal approach to cognitive enhancer control. In this policy, all citizens would have equal access to cognitive enhancers. This is the preferred option of the pro-enhancement group. The problem with such a policy is that it could lead to a chain reaction of coercion.[100]

If everyone is allowed to use cognitive enhancers freely then those that wish to use it will, as there is no penalty to be paid besides some potential health risks. The benefit of this approach is the ability for each person to make their own choice of usage of the

[98] V Dubljevic 'Principles of justice as the basis for public policy on psychopharmacological cognitive enhancement (2012) 4(1) *Law, Innovation and Technology* 67-83; V Dubljevic (2012)(1) 29-33; V Dubljevic 'Prohibition or coffee Shops: regulation of amphetamine and methylphenidate for enhancement use by healthy people' (2013) 13(7) *The American Journal of Bioethics* 23-33.
[99] Oxford Online Dictionary 'laissez-faire' available at: https://en.oxforddictionaries.com/definition/laissez-faire (accessed on 21 August 2018).
[100] V Dubljevic 'Cognitive enhancement, rational choice and justification' (2013) 6(1) *Neuroethics* 179-87 at 181 (hereafter V Dubljevic (2013)(2)).

substances.[101] However, those that do not use it would be disadvantaged as they would be competing for the same positions as those on cognitive enhancers. This would lead to those that do not wish to take cognitive enhancers having to take them in order to still be able to compete effectively with those who do. The policy that shall be chosen must be justifiable to both those that do not want to enhance and to those that do.[102] This policy clearly favours those that wish to use cognitive enhancers while causing a chain reaction of coercion for those that don't.[103]

5.4.2.2 Prohibition

A prohibition policy would entail banning cognitive enhancers so that nobody could make use of it. This, like the laissez-faire approach, is universal in nature and therefore would affect everyone equally.[104] This approach is the preferred option of the anti-enhancement movement.[105] The question is whether this would actually affect any change. In some countries, the use of cognitive enhancers is banned and yet still occurs on a regular basis.[106] The number of students in universities in South Africa currently using these drugs has previously been referred to.[107] Yet, it has been seen that legally such use is not permissible in South Africa. To try and prevent such use there would have to be random searches at schools, universities and places of work. The cost of the manpower and effort required would not be feasible in a third-world country such as South Africa. Furthermore, there would be privacy concerns around drug testing, especially where children are concerned. In this model, it can be seen that whereas a policy that is justifiable to both sides is being sought, currently there is one that clearly favours the anti-enhancement group.

[101] Ibid.
[102] Ibid.
[103] Ibid.
[104] Ibid.
[105] Ibid.
[106] In Germany, the possession and use of stimulants without a prescription is a criminal offence which could lead to a maximum of 3 years imprisonment. Furthermore, prescribing stimulants to healthy adults is a criminal offence. Yet, according to the available statistics, 33.4% of Methylphenidate is used off-label, while 12.6% is used without any diagnosis: Referred to by V Dubljević (2013)(2).
[107] See clinical chapter.

It is not clear whether this policy sets off the chain reaction of cognitive enhancement use in any case.[108] Currently, this is the policy that is in effect and yet people are still using the drug in order to try and obtain an advantage in the academic and work environments which leads others to feel pressured into using cognitive enhancers.

5.4.2.3 Gatekeeper

The gatekeeper approach is a more permissive approach that relies on health professionals to act as the "gatekeepers" of cognitive enhancer use.[109] The policy seems sound as it allows those who society trusts to prescribe medication with the power to do such for cognitive enhancers. Furthermore, it is the official policy in at least one country, Israel.[110] Synofzik argues that the gatekeeper model would allow physicians to make case and context-sensitive decisions about legitimate cognitive enhancement prescription to patients.[111] However, this model has been criticised for its lack of transparency and the economic incentives and disincentives that would be at play.[112] Dubljević argues that the problem with this approach is that whereas doctors have the training to diagnose illnesses and prescribe treatments, every person should have the right to decide for themselves whether to use cognitive enhancers or not.[113] By giving doctors the power to decide whether someone should be allowed to use cognitive enhancers it reduces the autonomy of the patient whatever those preferences may be in favour of a paternalistic policy.[114] Another problem presents itself because of the subjectivity of doctors. If a doctor does not feel that a certain patient should have access to cognitive enhancers the patient could go doctor shopping until one is found.[115] Those who have access to multiple doctors and the money to do such will be those with a higher socioeconomic status. Thus the policy

[108] V Dubljević (2013)(2).
[109] V Dubljevic (2013)(2) at 182.
[110] IC Ragan et al 'What should we do about student use of cognitive enhancers? an analysis of current evidence' (2012) 64 *Neuropharmacology* 588–95.
[111] M Synofzik 'Ethically justified, clinically applicable criteria for physician decision-making in psychopharmacological enhancement." (2009) 2(2) *Neuroethics* 89–102.
[112] V Dubljevic (2012)(1) at 32.
[113] Ibid.
[114] V Dubljevic (2013)(2) at 182.
[115] Ibid.

would end up favouring the wealthy and cause greater inequality in an already very unequal country.[116]

Finally, the issues around paternalism, inequality and the accumulation of power in doctors' hands (a symptom of medicalization) make the justification of this policy for all citizens unlikely in South Africa.

5.4.2.4 Coffee Shop Model

The coffee shop model is thus named as it is used in the Netherlands to control the sale of "soft drugs" such as cannabis and hallucinogenic mushrooms.[117] These substances are legal for personal use and can be bought from designated places called coffee shops.[118] Only soft drugs can be bought from an establishment, and only a certain quantity of such drug may be sold to an individual – 5g.[119] The drugs are limited to adults but not limited to citizens. No advertising of drugs is allowed and municipalities choose whether they will allow "coffee shops" in their municipality.[120]

The model may be effective for recreational drugs. However, the policy that is being sought is one for enhancement. The aim is to specifically separate the enhancement use from the recreational and treatment use. This policy would also allow for enhancement tourism, with unknown complications that may arise.[121]

5.4.2.5 Economic Disincentives Model (EDM)

The economic disincentives model has been proposed by Dubljević as a middle of the road approach that would accommodate the pro-enhancement as well as the anti-enhancement groups in the case of cognitive enhancers.[122,123] The model calls for an

[116] Ibid.
[117] Idem at 183.
[118] Ibid.
[119] Ibid.
[120] Ibid.
[121] Ibid.
[122] Idem at 184.
[123] V Dubljevic (2012)(1) at 32.

existing governmental organisation to offer a licencing procedure to pharmaceutical companies to market cognitive enhancers to adults.[124] This policy would allow all adults to access cognitive enhancers. This would favour the pro-enhancement group. However, there would also be a balancing of sorts. The policy calls for the imposition of taxes similar to sin taxes on cognitive enhancers.[125] Users would also have to write a test in order to show informed consent and obtain a licence for cognitive enhancer use.[126] This licence would have to be renewed annually all at the expense of the individual. In this way, all monies used for cognitive enhancement are obtained from private funds.[127] Furthermore, the taxes raised would be used to fund public education and healthcare thus balancing the inherent inequality in the use of cognitive enhancers by those that can afford them.[128] Individuals using cognitive enhancers would also have to take out specific medical insurance.[129] This would make sure that the public health facilities are in no way burdened by those who may experience the side effects of cognitive enhancers.[130] A negative of this policy is that enhancement licenses could be too difficult for people with low cognitive capacity thus precluding them from accessing cognitive enhancers.[131] This would have to be kept in mind when assessing how difficult to make such tests.

It could be argued that having tests for informed consent takes away from the doctor-patient relationship. Rather than letting a doctor handle this part of care society is allowing technology to do it. However, it would be argued that just because something has always been done a certain way does not mean it could not be done in another way. Using technology to make pharmaceuticals more easily available can make it

[124] V Dubljevic (2013)(2) at 184.
[125] Ibid.
[126] Ibid.
[127] Ibid.
[128] Ibid.
[129] Ibid.
[130] Glannon in W Glannon (2015) *Cognitive enhancement* http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199935314.001.0001/oxfordhb-9780199935314-e-43 (accessed on 5 September 2018) argues that cognitive enhancer users could be made to pay out of pocket for any medical expenses that arise or in the alternative have to take out higher medical insurance. This policy would be aimed at making sure that the users are accountable for any social costs caused by cognitive enhancer use.
[131] RH Blank 'Regulating cognitive enhancement technologies: policy options and problems' in F Jotterand and V Dubljević (eds) (2016) *Cognitive enhancement: ethical and policy implications in international perspectives* New York: Oxford University Press 242.

cheaper for people to access them, as the doctor's costs for a consultation are negated, and allow for doctors' and individuals' time to be better utilised. Such is already being debated in the U.S. where there is a discussion on using an app or online tests to be used to allow patients to access drugs instead of them having to go to a doctor.[132]

The policy attempts to perform the balancing act of having parts that are justifiable to the pro-enhancement and anti-enhancement groups. This leads me to propose such a framework with some tweaks for South Africa.

5.4.3 Policy options in South Africa

Below are two options that could be used for the framework of cognitive enhancers in South Africa. The major difference in the two policies being where cognitive enhancers may be purchased from.

5.4.3.1 Option 1 – Economic Disincentives Model (EDM)

EDM is sketched out above. It entails a similar model to what currently happens in South Africa regarding Tobacco control.[133] The relevant sections of the tobacco legislation in South Africa, which could be used to make a regulatory framework for such cognitive enhancer regulation has been dealt with. Below the relevant parts of Dublejević's work will be analysed to determine what is needed in South Africa.

Dubljević argues that current students and employees are using cognitive enhancers for positional advantage.[134] As was argued in the ethics chapter, money for cognitive enhancement should not come from the public purse as it is not a medical necessity. However, even if only private actors use cognitive enhancers there is still the matter of justice being carried out with regards to the positional advantage that these

[132] A Edney 'U.S. to make more drugs easily available, cutting role docs play' available at: https://www.bloombergquint.com/business/2018/07/17/u-s-to-make-more-drugs-easily-available-cutting-role-docs-play#gs.4Wxnc7s (accessed on 1 September 2018).
[133] See above 5.3.4 for a discussion re the TPCA.
[134] V Dubljevic (2012)(1) at 32.

individuals may gain. Such advantage needs to be balanced. This balancing, Dubljević argues should be done using taxes, fees and additional insurance for those who wish to enhance.[135] This is so that society has economic disincentives to enhance. The funds that would be obtained from these disincentives would be used for the least advantaged in order to create justice for both those that can afford the use of cognitive enhancers and those that cannot. The Economics Disincentives Model (EDM) would need to be put into effect using the following structures as proposed by Dublejević. They have been tweaked in order to account for the various conditions that are present in South Africa:

- The SAHPRA would offer a licensing procedure to companies that currently manufacture the drugs that are used off-label as cognitive enhancers. These being methylphenidate, modafinil and amphetamine salts. This license would allow the companies to create drug packaging and trade names different to the ones currently used to treat diseases.
- In the case of amphetamine salts, it will be proposed that the SAHPRA legalises the substance for sale in South Africa for adults with ADHD as is the case in the USA. Furthermore, the substance should also be legalised for use as a cognitive enhancer in South Africa.
- The companies who would manufacture the cognitive enhancers would be liable to bear all the costs pertaining to the licensing of the drugs. They would gladly do this as there is considerable money to be made.
- The cognitive enhancers will have their prices set as is already done via the Medicine Price Registry which uses a single exit price for each drug sold in South Africa.[136]
- Licensing procedure set up where citizens may obtain a licence to use cognitive enhancers after taking and passing a test showing that they have knowledge regarding the effects and side effects of cognitive enhancers. The citizens wishing to take the test will pay a fee thus financing the licensing procedure. The passing of the test will ensure that informed consent is given as the person will have the knowledge and therefore ability to consent.

[135] Ibid at 31
[136] S 22G MRSA 'Pricing Committee'.

- Specific insurance would have to be taken out in order that if any side effects occur the user will be covered.
- The cognitive enhancement user would then be registered and licensed to use cognitive enhancers.
- In order to maintain their cognitive enhancement license, the user would have to go for an annual check-up that would be done by a doctor. The results of such check-up to be sent to the licensing body for collation and further research.
- Cognitive enhancement drugs would be rescheduled as Schedule 0 substances. However, a ban would be put on the advertising of cognitive enhancers.[137] Schedule 0 substances have the important criteria of being available for sale anywhere. Section 22A of the MRSA 'Control of Medicines and Related Substances' states:

"Any Schedule 0 substance may be sold in an open shop".[138]

The structures mentioned would ensure that the whole endeavour is financed through the users and manufacturers of cognitive enhancers. Furthermore, cognitive enhancement would be made legal, controlled and monitored.[139]

With regards to taxes. The economics disincentives model calls for a tax to be placed on cognitive enhancers similar to those placed on alcoholic products and cigarettes. These taxes are called excise taxes and are colloquially called sin taxes. Here this thesis calls for an enhancement tax. The Customs and Excise Tax Act 91 of 1964 deals with these taxes.[140] This is used as a means of controlling the use of alcohol and cigarettes. There are two aims of this method. Firstly, to reducing smoking and drinking and the related harm and illness from the use of these substances. Secondly, to provide tax revenue for the government, some of which may be used to offset the healthcare costs. The current tax rate on cigarettes is 50% of the retail price.[141] The

[137] As Glannon in W Glannon (2015) states that due to a drug company's self-interest in promoting their drugs in a certain way, there would be reasons to regulating the statement's that drug companies make regarding the effects and side effects of cognitive enhancers.
[138] Section 22A MRSA.
[139] V Dubljevic (2012)(1) at 32.
[140] As amended by Act 112 of 1977.
[141] MC Buthelezi and M Reddi (2013) opine that this should be regarded as too low given that in countries such as Canada, New Zealand, Sweden and Australia it stands at 80%.

money collected from this tax would go towards basic health needs and education of the poor. Furthermore, if and when cognitive enhancers are found to be “beyond a doubt” effective for people or certain groups then this tax will help the government pay for cognitive enhancers which could be accessed in the public sector by those who could otherwise not afford such. The above is legitimate as it is in step with the requirements of justice. Furthermore, it does not take away from the autonomy of individuals any more than already occurs with sin taxes.

Using the above it is possible to create a regulatory framework that would allow consumers over 18 to purchase cognitive enhancers from stores that happen to stock them. The person purchasing such enhancers would have to produce their license which shows that they have taken a test. This test would verify that the user has knowledge of the benefits and risks involved in using cognitive enhancers.

This model would require that any drugs that may be sold and bought via this method be rescheduled as Schedule 0 to allow them to be sold at places which are not pharmacies.

However, the above option, where cognitive enhancers are available at storefronts may not be accepted and therefore, this thesis presents a second option that could be used in the alternate.

5.4.3.2 Option 2 – over the counter

This option recognises that society may not be ready to allow for cognitive enhancers to be sold at shop fronts. It is thus submitted that in this instance cognitive enhancers are rather sold at pharmacies where they are in any case currently sold due to their scheduled status. The following structures would be used for this option:

- The SAHPRA would offer a licensing procedure to companies that currently manufacture the drugs that are used off-label as cognitive enhancers. These being methylphenidate, modafinil and amphetamine salts. This license would

allow the companies to create drug packaging and trade names different from the ones currently used to treat diseases.

- In the case of amphetamine salts, it is proposed that the SAHPRA legalises the substance for sale in South Africa for children and adults with ADHD as is the case in the USA.
- The companies who would manufacture the cognitive enhancers would be liable to bear all the costs pertaining to the licensing of the drugs. They would gladly do this as there is considerable money to be made.
- The cognitive enhancers will have their prices set as is already done via the Medicine Price Registry which uses a single exit price for each drug sold in South Africa.[142]
- Specific insurance would have to be taken out in order that if any side effects occur the user will be covered.[143]
- Licensing procedure set up where citizens may obtain a licence to use cognitive enhancers after taking and passing a test showing that they have knowledge regarding the effects and side effects of cognitive enhancers. The citizens wishing to take the test will pay a fee thus financing the licensing the procedure. The passing of the test will ensure that informed consent is given as the person will have the knowledge and therefore ability to consent.
- The cognitive enhancement user would then be registered and licensed to use cognitive enhancers.
- In order to maintain their cognitive enhancement, license the user would have to go for an annual check-up that would be done by a doctor. The results of such check-up to be sent to the licensing body for collation and further research.
- Cognitive enhancement drugs would be rescheduled as Schedule 1 substances. However, a ban would be put on the advertising of cognitive enhancers. Schedule 1 substances have the important criteria of still being held at a pharmacy. Section 22A of the MRSA states:

"Any Schedule 1 substance shall not be sold-

[142] S 22G MRSA.

[143] Dublejević argues that this insurance would guarantee that any side effects that require the use of healthcare would not come from funds meant for public healthcare but rather from private companies.

(a) by any person other than-
(i) a pharmacist, or a pharmacist intern or pharmacist's assistant acting under the personal supervision of a pharmacist;
(ii) a manufacturer of or wholesale dealer in pharmaceutical products for sale to any person who may lawfully possess such substance;
(iii) a medical practitioner or dentist, who may-
(aa) prescribe such substance;
(bb) compound and dispense such substance only if he or she is the holder of a licence as contemplated in section 22C(1)(a)".[144]

Thus, the major difference between option 1 and option 2 is where the sale of cognitive enhancers can be made. This difference is crucial as pharmacists, nurses and other medical professionals are trained in recognising illness and society may prefer these professionals to be the gatekeepers to such drugs.

5.5 Summing up

In this chapter, the relevant constitutional, legislative and legal articles that will help to create a framework for the legal use of cognitive enhancers by people with no medical diagnosis warranting their use in South Africa have been looked at. This use will entail allowing people to be able to purchase cognitive enhancers at shopfronts in a similar way to that of tobacco. In order to balance the scales of justice, it is proposed that an enhancement tax be placed on cognitive enhancers which should be used to fund public healthcare and public education. In order to correctly manage the benefits that cognitive enhancers could provide the public policy and regulations need to contribute to reducing inequality by supporting broad development, competition, and in the future, subsidized access for disadvantaged groups. If the process is not managed properly, society could be left with a situation where public policy and regulation contribute to inequality by driving up prices, limiting access and creating black markets.[145]

[144] S 22A (4) MRSA.
[145] RH Blank (2016) at 247.

Chapter 6: Ethical and legal framework for research into cognitive enhancers in South Africa

6.1 Introduction

The previous chapter set out the legal aspects relating to the use of cognitive enhancers by adults in South Africa. Taking into account all the legal and ethical implications discussed before, the situation would also require that more research is done on these cognitive enhancers and the different effects, side effects and usage patterns of such drugs in South Africa. The fact that cognitive enhancers are being used widely has been shown in the clinical chapter. However, there are mixed opinions as to the efficacy of these drugs. There is research that shows that they work while others show that they may or may not have the effects that many have thought they have. The drugs in question, being Methylphenidate, Adderall and Modafinil were all created in an attempt to treat diseases and the research done was on individuals with such diseases. Yet, healthy individuals are now using them as cognitive enhancers. What side effects, both acute and chronic, may the use of such drugs have on these healthy users as opposed to those in diseased states?

A drug is tested in order to further scientific research and to allow new drugs to be tested to treat diseases in a safe, innovative and efficacious manner. The drugs referred to in this thesis all obtained approval[1] based on the benefits they provide in treating diseases. However, they are currently being used off-label to provide cognitive enhancement benefits to healthy individuals. With the increased demand for these drugs, the manufacturers may find it worthwhile to do research in order to obtain approval for their cognitive enhancement benefits, thereby avoiding restrictions placed on marketing off-label medications.[2] The off-label use situation of these drugs has led to doctors becoming the current gate-keepers of these medications. Studies to

[1] Drugs are approved based on research done to show that they are safe and efficacious. This approval is given by the regulatory body entrusted to do so. In South Africa, this is the South African Health Products Regulatory Authority (SAHPRA) and in the USA this is the Food and Drug Administration (FDA).

[2] MJ Mehlman et al 'Ethical and legal issues in enhancement research in human subjects (2011) 20(1) *Cambridge Quarterly of Healthcare Ethics* 30-45.

ascertain safety and efficacy, or health surveys to monitor the side effects of using cognitive enhancers are clearly needed. To fund such studies will require financial resources for something that is not a health issue but rather to assess enhancement effects. This entails the interplay between the different stakeholders of research: funding bodies, researchers, pharmaceutical companies, government, research ethics committees and clinicians.[3]

How is the ethical research of such drugs on children and adults when there is no disease to cure, no normal weighing of risks and benefits to counteract the ethical argument of non-maleficence? Without ethical and regulatory guidelines addressing the special issues raised by enhancement research, subjects of such research may be exposed to unacceptable risks, including risks that would be acceptable in therapy-oriented research but not in enhancement research.[4] This chapter deals with the ethics of conducting such research while also looking at the legal framework available for conducting medical research in South Africa and determining if it would allow for such research or if it would have to be changed. It should be remembered that the research would help answer the two most important questions concerning cognitive enhancers: are these drugs safe and do they work?[5]

6.2 Why should research on cognitive enhancers be done?

The question that must first be asked is why should research be done in this subject? Forlini et al. state that safety data on the long-term effects of drugs with potential for use as cognitive enhancers is deficient[6] and establishing the safety of these drugs requires further attention. They go on to give three main reasons as to why research needs to be done into cognitive enhancers.[7]

[3] C Forlini et al 'Navigating the enhancement landscape: ethical issues in research on cognitive enhancers for healthy individuals' (2013) 14(2) *EMBO Reports* 123-128 at 125.
[4] MJ Mehlman et al (2011) at 31.
[5] C Forlini et al (2013) at 123.
[6] Ibid. Here Forlini et al. refer to the Commission de l'éthique de la science et de la technologie (2009) '*Position statement on psychotropic drugs and expanded Uses: an ethical perspective*'
[7] Ibid at 124.

1. The prevalence data shows that the use of cognitive enhancers is a widespread occurrence in many countries.[8] Research on cognitive enhancers would allow for solid and verifiable efficacy data to be gained on these drugs as to whether they actually have any cognitive-enhancing effects and what these may be.
2. Research on cognitive enhancers would allow for more informed ethical decision-making and regulation. Only once the actual effects and side effects of cognitive enhancers are adequately fleshed out via concrete research can the public have enough information to make a decision that is informed[9]. The research would also allow policymakers to be able to make effective policy as to who may use these drugs, where they may use them and how they may use them. One such guide that has already been made is the American Academy of Neurology which addressed concerns of possible long-term effects of the use of cognitive enhancers.[10]
3. The research of the prevalence of use and demand could help create prevention policies if these drugs are in fact found to be harmful. In this case, a public health issue would need to be prevented and such research would allow enforcement agencies to understand where major use of such drugs is taking place.[11]

6.3 Ethical research

It is internationally accepted that ethical norms should be applied and enforced in research that has human participants.[12] The ethical principles that are followed are

[8] See clinical chapter for statistics relating to the prevalence found in different countries and among students and adults.
[9] To make an informed decision the medical user needs information and knowledge i.e. to understand the information supplied. The requirements needed for informed consent to operate were laid down by Ackermann J *in Castell v De Greef* 1994 (4) SA 408 (C). Without proper research into the drug, information on the drug cannot be given.
[10] The American Academy of Neurology, in their analysis, opined that the long-term effect of these drugs on the brain warrants attention due to lack of research: D Larriviere et al 'Responding to requests from adult patients for neuroenhancements: guidance of the ethics, law and humanities committee' (2009) 73(17) *Neurology* 1406-12.
[11] C Forlini et al (2013) at 125.
[12] AE Strode et al 'Research ethics committees in a tight spot: approving consent strategies for child research that are *prima facie* illegal but are ethical in terms of national guidelines' (2018) 108(10) SAMJ 828-32; World Medical Association 'WMA Declaration of Helsinki – ethical principle for medical research involving human

the same as those used in the care of patients.[13] Even though research allows for the understanding of new procedures and medicines, this must not come at the expense of the participants of such studies. The scientific goals of society must be secondary to the protection of research participants.[14]

This is done through the structure known as the Research Ethics Committee. A Research Ethics Committee is defined in the legislation as:
A Health Research Ethics Committee (referred to as a Research Ethics Committee or a REC) is any REC referred to in section 73 of the National Health Act 61 of 2003. It states:

(1) Every institution, health agency and health establishment at which health research is conducted, must establish or have access to a health research ethics committee, which is registered with the National Health Research Ethics Council.
(2) A health research ethics committee must-
(a) review research proposals and protocols in order to ensure that research conducted by the relevant institution, agency or establishment will promote health, contribute to the prevention of communicable or non-communicable diseases or disability or result in cures for communicable or non-communicable diseases; and
(b) grant approval for research by the relevant institution, agency or establishment in instances where research proposals and protocols meet the ethical standards of that health research ethics committee.

The purpose of the review performed by the Research Ethics Committee is specifically to:

- Protect participants from harm by doing a risk-benefit analysis
- Hold researchers accountable for their research activities

subjects' available at: https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/ (accessed on 4 October 2018).
[13] Department of Health 'Ethics in health research guidelines' (2015) at 14 states that the broad ethical principles to be followed are: autonomy, beneficence, non-maleficence and justice.
[14] Department of Health 'Guidelines for good practice in the conduct of clinical trials with human participants in South Africa' (2006) comments that "the outcomes of clinical trials are only acceptable when conducted in an ethical way".

- Promote important social and ethical values[15]

This means that Research Ethics Committees are the main role-player in the research system of protecting participants and enforcing their rights. However, the Research Ethics Committee can be seen as a paternalistic structure.[16] This is because it has an expert panel which decides whether research is ethical. The guidelines that must be used by the REC's is the Health Research Guidelines[17]. These researchers thus decide what is and is not ethical. Only after research has been approved as ethical by the committee may the researchers go out and attempt to obtain informed consent for participants to participate in a trial. With regards to health-oriented research, such an approach may be justified as these experts are in the best position to weigh the potential risks and benefits. However, when regarding enhancement benefits it is not as evident that such experts have any advantage over potential participants in deciding such risks and benefits.[18] Furthermore, there is no agreed-upon "normal" baseline point of reference and the beneficial effects of the enhancements may be highly subjective.[19] These factors have led Mehlman et al. to suggest that subjects of enhancement trials should have more control over accepting potential risks for perceived benefits than those in health-oriented research.[20] Experts would still be needed to make sure that participants are not abused and that they understand the risks and benefits involved.[21] However, the decision as to whether the research should

[15] Department of Health 'Ethics in health research guidelines' (2015) at 1.6.7 shows that the REC's duties are subjective as the value placed on cognitive enhancers in one society may be different to another. Given the ethical arguments discussed in a previous chapter, it could be said that the ethical and social values would promote the research of cognitive enhancers.

[16] Ibid.

[17] Ibid at 1.6.5 states that the Research Ethics Committees must use this document as a minimum benchmark when determining whether a research proposal or protocol is acceptable. This is also referred to in the National Health Act 61 of 2003 at s 73(2)(b).

[18] It should be noted that the Department of Health 'Ethics in health research guidelines' (2015) at 1.6.6 itself states that the "Ethics review is not about obstructing scientific progress or innovative research." This should be remembered by the committee as regardless of their individual feelings, their job is to make sure that ethical research is performed that does not compromise the rights of the volunteers.

[19] Ibid.

[20] MJ Mehlman et al (2011) at 31.

[21] Department of Health 'Ethics in health research guidelines' (2015) at 8, states that the core ethical principles of research involving living human participants place the safety, welfare and interests of humans as paramount. These concerns need to be balanced. In terms of cognitive enhancement, the safety of some humans could be viewed as less important than the interests of humans overall in determining the risks and benefits of such cognitive enhancers.

be done would be left up to the willingness of participants to participate in such research.

In the Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research (1979) the ethical principles specifically related to research together with their application are set out.[22] These principles are autonomy, beneficence and justice. In respect to research these principles are summarised as follows[23]:

- Autonomy: participants are autonomous and should be treated as such. Protection must be provided for those with diminished autonomy such as children and mentally incapacitated adults
- Beneficence: researchers working with humans must maximise benefits and minimise harm to subjects.
- Justice: there must be a balance between benefit and risk. Subjects must be treated fairly.

These match principles that are given by Beuchamp and Childress[24]. The Belmont Report goes on to define the applications that these principles give with regards to doing ethical health research. These principles are: risk/benefit assessment, informed consent and the selection of research subjects. With regards to cognitive enhancers, the two applications that will be focused on in this thesis are the risk/benefit assessment and informed consent.

6.3.1 Assessing risk and benefit

The concept of risk-benefit analysis is one of the most sensitive topics in cognitive enhancement research. How are the risks of whether a clinical trial would outweigh the potential benefits to be decided? Mehlman et al. opine that the degree of potential

[22] C Van Wyk 'Guidelines on medical research ethics, medical "experimentation" and the Constitution' (2001) 64 THRHR 3 remarks that this work is the best interpretation of research ethics in the United States of America.
[23] K Moodley 'Research ethics and scientific enquiry' in K Moodley (ed) *Medical ethics, law and human rights: A South African perspective* (2010) at 319.
[24] TL Beauchamp and JF Childress *Principles of biomedical ethics* 7 ed (2013).

benefits is dependent on the nature of the benefit as well as its amount. The more important the potential benefit, the greater the risks that researchers ethically can impose on subjects.[25]

The ratio of the risk of harm to the likelihood of benefit should be favourable in the research to be conducted. This means that the likelihood of benefit to the type of persons involved should outweigh the harm to participants in the trial as well as the community or society. Therefore, the analysis is not only concerned with the participants but also with the society at large and their interests.[26]

However, it could be argued that the benefit of an enhancement is of much less value to society than treatment-oriented research and that it would be unethical to conduct such research unless the benefits vastly exceeded the supposed risks.[27] Perhaps increasing cognitive function substantially in normal individuals could be viewed as more valuable than curing a minor ailment? In a society that is based on a knowledge economy, it is trite to state that to enhance someone's cognitive abilities would be viewed as important[28] and therefore to argue that cognitive enhancers are not important to society would be disingenuous.

If the argument over the worth of the benefits of cognitive enhancers is not accepted, then another approach could be used. To circumvent such arguments, the research that would be done could be said to be of a "defensive" nature. I.e. it would be done because of the prevalence of these drugs already being used in the healthy population.[29] Since the drugs referred to in this thesis are used off-label for cognitive

[25] MJ Mehlman et al (2011) at 32.

[26] Department of Health 'Ethics in health research guidelines' (2015) at 3.1.6. The guidelines state that the ratio can be calculated by analysing the following:

- Harms and benefits adequately identified, evaluated and described
- Harms stated in proposal match those stated in informed consent documentation
- Risk of harm is reasonable in relation to anticipated benefit
- Risk of harm is reasonable in relation to the importance of anticipated knowledge to be gained
- Counselling and support services to be made available

[27] MJ Mehlman et al (2011) at 32.

[28] The same way that education is considered a basic human right per s 29 of the Constitution of South Africa, 1996 (hereafter the 'Constitution'), this shows how important improving a person's cognition is to society in this modern age.

[29] See clinical chapter.

enhancement, perhaps this use could stimulate the government to perform safety research to determine the benefits and risks involved in people using this in an off-label method.[30] The research would focus on whether such drugs have risks for the large number of users. Under such conditions, a Research Ethics Committee may decide that the risks to the small number of participants outweigh the potential avoidance of harm to the much larger number of users in the public.[31]

6.4 Why should cognitive enhancement research not be done?

There are also reasons for research not to be done on cognitive enhancers. The main issues against conducting research include:

1. Studying cognitive enhancers would direct a sizeable amount of funding to analyze something that is not a health issue. People taking cognitive enhancers do so to enhance and not because they can be defined as ill. The activity of cognitively enhancing is still an ethically questionable activity and therefore there are those that believe that such funding should not be granted.[32,33]
2. If the research found cognitive enhancers to be safe and effective for healthy individuals, any bans or regulations could create a black market for these drugs.[34]

Given these concerns funding agencies or policy-makers might choose to promote research, restrict research or not address the question at all.

---

[30] MJ Mehlman et al (2011) at 31.
[31] Ibid at 33
[32] C Forlini et al (2013) at 123.
[33] Shook and Giordano in J Shook and J Giordano 'Defining contexts of neurocognitive (performance) enhancements: neuroethical considerations and implications for policy' in F Jotterand and V Dubljević (eds) *Cognitive enhancement: ethical and policy implications in international perspectives* (2016) at 88 state that policy tends to approve research when it could soon help those with the most severe and/or epidemiologically prevalent health conditions. This would not work for cognitive enhancers because:
(a) a traditional approach would leave enhancements as last to be studied or given approval
(b) unless the research can be shown to provide some therapeutic benefit against a disease, condition, or disorder, financial and administrative support would not be forthcoming.
[34] C Forlini et al (2013) at 123.

6.5 How should research be done?

In order for research to be ethically justified there are a few key criteria that it must fulfil[35]:

- It must be scientifically meaningful.
- It must generate sound results with a call for further evidence.
- The research must clearly state that the study is focused on enhancement.
- It must deal with quantitative or qualitative effects or side effects of the drugs.
- It must be linked to real-world performance of such drugs.

Thus, there is in place an ethical framework that has arguments for and against the research of cognitive enhancers on human participants. Ethics and the law are interlinked to form the normative guidance for such research.[36] Therefore, the legal position that is found in South Africa needs to be assessed as well.

This will allow for the determination as to what can and cannot be done at present and allows for the understanding of how South African society would view such research. It should be remembered that the rights of those who partake in trials must be protected. Nienaber has argued that the law of the land, in this case, South Africa can be used effectively to protect such rights because it has the force of law.[37] The law does not replace the ethical guidelines seen above but rather augments and reinforces them. Below the layered-approach will be used, as in earlier chapters, to determine what the legal view of such research is in South Africa.

6.6 Legal considerations

Any research being done must be classified according to the type of research that it is. In this regard, it must be determined what is considered research in the health science in South Africa. The definition of "health research" is defined in the National Health Act 61 of 2003 as:

---

[35] Ibid at 125.
[36] Ibid at 128.
[37] A Nienaber 'The protection of participants in clinical research in Africa: does domestic human rights law have a role to play?' (2008) 8(1) *African Human Rights Law Journal* 138-62.

"health research" includes any research which contributes to the knowledge of –
(a) the biological, clinical, psychological or social process in human beings;
(b)…
(c)…
(d)…
(e)…
(f) the development of new application of pharmaceuticals, medicines and related substances; and
(g)…

It is clear from this definition that any research done on pharmacological cognitive enhancers would be known as health research.[38]

In South Africa, when considering the legal position, one must start by looking at the Constitution to determine its view with respect to research on human subjects. From there a layered approach can be used in determining the legal framework for such research as it currently stands in South Africa.

The importance of section 12(2)(c) of the Constitution in protecting individuals' rights cannot be overstated. Nienaber has stated that this section comes to endorse the fundamental rights of autonomy and physical integrity.[39]

The Constitution states in section 12, titled Freedom and Security of the person, that:
(2) Everyone has the right to bodily and psychological integrity which includes the right -

[38] The broadness of the term, health research, is seen by Strode in A Strode 'The parameters of the current legal framework for health research: forms of health research which are regulations and obligations imposed on researchers' (2013) 6(2) *SAJBL* 69-71 at 71 to be a key strength of the framework for research created by the National Health Act. He states that this broadness ensures that a wide range of studies must focus on national research priorities, comply with ethical norms, and be submitted for ethical review.
[39] A Nienaber 'Informed consent to participation in preventive HIV vaccine efficacy trials in the light of section 12(2)(c) of the South African Constitution' (2008) 33(1) *Journal for Juridical Science* 69-101 at 94.

(c) not to be subjected to medical or scientific experiments[40] without their informed consent.[41]

It is clear that the South African Constitution points out that a person may not be part of research where they do not understand the risks and benefits involved and therefore are not able to make an informed decision whether to participate. This presents a challenge in allowing those that do not have the capacity to consent such as the mentally incompetent or minors from being part of the research. The challenge together with the answer to it is outlined in the section concerning minors in the research below.

It is trite to state that section 12 goes hand in hand with section 10, Human Dignity, which states that:

Everyone has inherent dignity and the right to have their dignity protected and respected.[42]

From this section, it can be seen that no one may be degraded or have their dignity compromised in order to perform medical research even if such research would benefit others in the future.

The next layer to consider is the legislation that controls the research into human subjects. This is laid out in the National Health Act. Section 71 specifically deals with research on human subjects in both adults and children. This section together with the

[40] The term 'experiments' originates from Article 7 of the United Nations International Covenant on Civil and Political Rights, 1966 and has the same wording as the Nuremberg Code; in the Constitutional context, it is intended to mean 'research': Department of Health 'Ethics in health research: principles, processes and structures' 2 ed (2015) at FN 1. This is corroborated by Nienaber who states that 'experimentation' and 'research' are used interchangeably in various international ethical documents and the National Health Act: A Nienaber (2008) at 94.
[41] Section 12(2)(c) Constitution.
[42] Section 10 Constitution.

Regulations Relating to Research with Human Participants[43] needs to be considered in order to understand what the legislation requires. With regards to adults, it states:

(1) Notwithstanding anything to the contrary in any other law, research or experimentation on a living person may only be conducted-
(a) in the prescribed manner; and
(b) with the written consent of the person after he or she is informed[44] of the objects of the research or experimentation and any possible positive or negative consequences on his or her health.[45]

It can be seen that a major factor encompassing the performance of research on adults is that they give informed consent.[46] This is also a well-established international law principle.[47] The principle of autonomy is respected herein that an adult of sound mind may decide what to do with their own body including having research done on it.

[43] A "human participant" refers to any living person about whom a researcher obtains data or specimens or identifiable private information through intervention or interaction with that person: Regulations Relating to Research with Human Participants GG R 719 (19 September 2014) Reg 1 at 'human participant'.
[44] Regulations Relating to Research with Human Participants Reg 5 states that human participants, in order to give "informed" consent, must be informed of the following:

a) The purpose of the research
b) The methods and procedures, including possible randomisation.
c) Alternatives to participation in the research.
d) The potential harms and risks of harm posed by the research
e) The expected benefits of the research
f) The freedom to choose to participate or not, or to withdraw from the research without penalty or reason.
g) The extent to which confidentiality and privacy will be maintained.
h) Details of the contact person in the event of a query or research-related injury
i) Reimbursement and/or incentives given for participation
j) Information about the sponsor
k) Any potential conflict of interests
l) Information about approval from the health research ethics committee or the SAHPRA, where relevant.
m) Insurance in the event of research-related injury, for more than minimal risk research; and
n) The availability of beneficial products or interventions post-research.

[45] Section 71(1) National Health Act.
[46] Department of Health 'National health guidelines' (2015) at 3.1.9 states that "informed consent is a necessary but insufficient element of ethical research, i.e. that a person voluntarily chooses to participate does not mean that the research proposal is ethical. All the other elements should stand up to ethical scrutiny." It can be seen from this that even though informed consent must be obtained, the actual study must be ethical. This follows the principle in South Africa of *bone mores*. Consent cannot be given *contra bone mores* i.e. contrary to public policy. If the research is not ethical then consent is worthless. J Neethling et al *The law of delict* 6 ed (2010) 36-40.
[47] Point 1 of the Nuremburg code, 1947; International Convention on Civil and Political Rights, 1966 Article 7.

However, in order to participate in such research, the participant must have all the relevant facts in front of him/her to be able to make a decision. Furthermore, the participant must have the capacity to understand the facts and thereby give informed consent.[48]

The Regulations Relating to Research with Human Participants must be looked at in order to ascertain the prescribed manner in which research is to be done. Regulation 2 thereof titled: "Principles guiding research with Human Participants" states:

Health research that involves human participants must:

a) Comply with the Department of Health national ethical guidelines for research[49] with human participants at a minimum;
b) Be responsive to health needs or priorities of the population, participating community or proposed participants;
c) Have a valid scientific methodology and be likely to provide answers for the specific research questions that are posed;
d) Include a favourable risk-benefit analysis;
e) Ensure that the recruitment process is just and fair;
f) Be undertaken with appropriate consent processes;
g) Undergo independent review by a registered health research ethics committee;
h) Respect participants' rights, including but not limited to rights to dignity, privacy, bodily integrity and equality;
i) Make provision for compensation for research-related injury, for more than minimal risk research; and

[48] *Castell v De Greef* 1994 (4) SA 408 (C) is noted as the *locus classicus* of informed consent. Therein Ackermann J at 425H-I stated the criteria needed for informed consent to have said to have been given, namely:
"For consent to operate as a defence the following requirements must, *inter alia,* be satisfied:
1. a) The consenting party 'must have had knowledge and been aware of the nature and extent of the harm or risk';
2. b) The consenting party 'must have appreciated and understood the nature and extent of the harm or risk';
3. c) The consenting party 'must have consented to the harm or assumed the risk';
4. d) The consent 'must be comprehensive, that is extend to the entire transaction, inclusive of its consequences'. (See Van Oosten (*op cit* at 13-25 and the authorities there cited).)"

[49] Department of Health 'Ethics in health research: principles, processes and structures' (2015).

j) Be managed by a lead researcher, or person with similar standing or title, with suitable experience and qualifications.[50]

It should be noted that none of these principles would pose a problem to enhancement research. In fact, sub-regulation (b), which talks about "responsiveness to health needs" would actually encourage such research to ascertain the risks and benefits of cognitive enhancement use that is already happening.

The committee that approves a research protocol before a study may commence is the research ethics committee (REC). Section 72 of the National Health Act which deals with the National Health Research Council, subsection 6(C), states that the National Health Research Council must set norms and standards for conducting research on humans and animals, including norms and standards for conducting clinical trials.[51]

The legislation necessarily gives rise to the practical aspect of how research should be assessed to ascertain whether it should be allowed to be performed. The performance of such must be first approved by a Research Ethics Committee.[52] The guidelines entail various ethical considerations that should be met before a research proposal can be given the stamp of approval as being ethically justified[53]. Below are the considerations which the committee should consider before allowing research to be done.

- Relevance and value: research should be responsive and relevant to the people of South Africa.
- Scientific integrity: The study's design and methodology are vital for research integrity, regardless of the discipline
- Role player engagement
- Favourable risk-benefit ratio

[50] Regulation 2 Regulations Relating to Research with Human Participants.
[51] The National Health Act defines "clinical trials" at s 72(7) as a systematic study, involving human subjects that aims to answer specific questions about the safety or efficacy of a medicine or method of treatment.
[52] Department of Health. Ethics in Health Research Guidelines. (2015) at 11
[53] Ibid at 15.

- Informed consent
- Ongoing respect for enrolled participants

With regards to the relevance of such research. It can be seen from the clinical chapter that such research would be very relevant in South Africa given the number of children and adults currently using cognitive enhancers on a daily basis without any underlying illness. The only way to properly understand the benefits and risks involved is to conduct research into cognitive enhancers and ascertain the effects and side effects of acute and chronic use of such.

6.7 Minors[54] in cognitive enhancement research

Minors need to also be included in research, because they may also benefit from such research and there are specific risks and benefits that may not be determined without their participation.[55] There is a global trend towards including children in research while recognizing that they need to be protected.[56] As has been stated previously, minors are given special protection in society due to their vulnerable status.[57] Everything that is done for or on a minor must be in their best interests.[58] The criteria for doing health research on minors is therefore stricter than that for adults. The research done on minors is divided by legislation into two types. For therapeutic purposes and non-therapeutic purposes.[59]

6.7.1 Legal considerations:

[54] Minors here is used synonymously with 'child' defined in s 28 the Constitution as "a person under the age of 18 years".
[55] A Strode et al 'Failing the vulnerable: three new consent norms that will undermine health research in children' (2014) 15(2) *South African Journal of HIV Medicine* 46-9 at 46.
[56] Ibid.
[57] Strode and Slack in AE Strode and CM Slack 'Child research in South Africa: how do the new regulations help?' (2015) 105(11) *South African Medical Journal* 899-900 state that the Health Professions Act confirms that minors should be considered a vulnerable population. "Vulnerable persons" are defined as: research participants who are at 'increased risk of research-related harm, or who are limited in their freedom to make choices, or relatively incapable of protecting their own interests'.
[58] Section 28(2) Constitution.
[59] See Ss 71(2) and (3)(a) National Health Act for the requirements for conducting research for each of the two purposes respectively.

The Constitution states in Section 27:

(1) Everyone has the right to
(c) healthcare services, including reproductive health care;[60]

The Constitution further states in Section 28:

(1) Every child has the right
(c) to basic nutrition, shelter, basic healthcare services and social services;[61]

Strode et al. argue that given the right to basic health care and health care services, any exclusion of children from health research infringes on their constitutional rights.[62] This is inferred from the fact that the exclusion of children from studies may lead to ineffective or harmful information on drug efficacy or dosages.[63]

A problem arises with a strict interpretation of section 12 of the Constitution:

The Constitution states in section 12, titled Freedom and Security of the person, that:
(2) Everyone has the right to bodily and psychological integrity which includes the right -
(c) not to be subjected to medical or scientific experiments without their informed consent.[64]

A problem that has been identified by legal scholars is the word "their".[65] The term seems to indicate that consent must be directly received from the person. This

[60] Section 27(1) Constitution.
[61] Section 28(1) Constitution.
[62] A Strode et al (2014) at 47.
[63] A restrictive reading of The Nuremberg Code, 1947 requires a research participant to have legal capacity in order to consent to being involved in research. Since children do not have this they were excluded from all research. Recently there has been a shift away from such exclusion because of the negative effects of not being able to test potentially beneficial treatments of children before being offered to children in general. See further: A Strode 'A critical review of the regulation of research involving children in South Africa: from self-regulation to hyper-regulation' (2015) 2 *TSAR* 334-46.
[64] Section 12(2)(c) Constitution.
[65] A Nienaber (2008).

interpretation would prevent mentally incompetent individuals or children from participating in research as they are not able to give consent. Van Oosten argues that consent from guardians or parents of minors and mentally ill persons would be impossible.[66] Van Wyk states that such would preclude research in minors and mentally ill patients which is out of step with the view taken by the rest of the world and would hinder medical progress of drugs for these groups.[67] The National Health Act and Ethics in Health Research Guidelines are in agreement with Van Wyk's interpretation.

The Regulations relating to Research with Human Participants gives guidance on exactly what is meant by therapeutic and non-therapeutics research. It states that:

Therapeutic research means research that holds out the prospect of direct benefit to the participant

Non-therapeutic research[68] means research that does not hold out the prospect of direct benefit to the participant but holds out the prospect of generalizable knowledge.[69]

[66] Van Oosten comments that the term "their" precludes mentally disabled people or minors from being able to consent to participating in research as they cannot consent: FW Van Oosten *The doctrine of informed consent in medical law* (1989) unpublished LLD thesis, University of South Africa at 9.

[67] Van Wyk states that a strict interpretation like that of Van Oosten "would preclude research in South Africa on legally incompetent people, such as young children, who are not capable of providing voluntary informed consent. This would also preclude research where proxy consent from their parents or care-givers is obtained. This would render South Africa out of step with the rest of the world in this respect, and would undeniably hinder medical progress": C Van Wyk 'HIV preventative vaccine research on children: is this possible in terms of South African law and research guidelines?' (2005) 68 *THRHR* 35-50 at 38.

[68] Nienaber states that the distinction between therapeutic and non-therapeutic research fails to account for the risk profiles associated with both. Therapeutic risks may have severe risk attached whereas non-therapeutic research may have no or little risk such as with a questionnaire. Yet non-therapeutic research has the burden of obtaining ministerial permission regardless. This is relevant to cognitive enhancer research as it adds extra burdens to doing epidemiological surveys that would be of benefit in understanding the prevalence of cognitive enhancer use in different populations: A Nienaber 'Consent to research by mentally ill children and adolescents: the implications of chapter 9 of the National Health Act' (2013) 19(1) *South African Journal of Psychiatry* 19-23.

[69] Regulation 1 Regulations relating to Research with Human Participants.

It is clear from these definitions that cognitive enhancement research, which would definitely hold the prospect of enhancing the cognitive abilities of the participants, would fall under therapeutic research.[70]

Since only therapeutic purposes are being dealt with, only this part needs to be looked at.[71] This can be seen in the criteria given in the National Health Act regarding research on children. Section 71 states:

(2) Where research or experimentation is to be conducted on a minor for a therapeutic purpose, the research or experimentation may only be conducted –
(a) if it is in the best interests[72] of the[73] minor; [74]
(b) in such manner and on such conditions as may be prescribed.

[70] Nienaber points out that it is often difficult to discern between therapeutic and non-therapeutic research. There will always be some element of research such as drawing blood from the patient or those participating in the placebo arm of the trial that will not gain any personal benefit from the trial. Therapeutic research merely has the potential to benefit the individual, given that an unproven drug is being used: Nienaber (2013) 19-23.
[71] Department of Health 'National Research Guidelines' (2015) at 3.2.2.1(c) states that the practical import of therapeutic v non-therapeutic research is of little practical import since most research involves components of both and therefore the Research Ethics Committee will look at the research proposal as a whole.
[72] Regulation 1 Regulations Relating to Research with Human Participants defines "Best interests" as: means significant decisions affecting a minor's life should aim to promote, amongst others, the minor's physical, mental, moral, emotional and social welfare.
[73] Nienaber (2013) 19-23 states that the word "the" used here indicates that the research cannot be done in the best interest of other children but must also be in the best interest of the particular child on which the research is being done.
[74] Nienaber states that this is in keeping with the best-interests clause present in the Constitution of South Africa, 1996: "A child's best interests are of paramount importance in every matter concerning the child", and the Children's Act Section 9: "all matters concerning the care, protection and well-being of a child, the standard that the child's best interest is of paramount importance, must be applied": ibid.

(c) with the consent of the parent or guardian of the child[75,76,77,78];

(d) if the minor is capable of understanding, with the consent of the minor[79,80]

[75] A Strode et al (2014) 46-9 opine that this condition together with section 71(1)b which states that such consent from the guardian or parent must be in writing will limit the circumstances in which minors may participate in research. Such circumstances that are limited by the legislation include:

- Passive consent that may have been given by the parents after informing them of such research (an opt-out type of study).
- Certain groups would also not want to obtain consent because of potential backlash.
    - Men who have sex with men. Adolescents are unlikely to get parental consent because of fear of stigmatization
    - Behaviour that is illegal. Such as use of alcohol, tobacco or use of methylphenidate and modafinil bought, traded or given from friends.
    - Minimal or no-risk research with children over the age of 12, using a passive consent approach. Such research would be helpful in understanding prevalence and use of cognitive enhancers in children.

However, the consent does not overcome the child's privacy interests. Department of Health 'National research guidelines' (2015) at 3.2.2.1(g) states that the consent given by the parents or guardian "does not mean that parents are entitled to know the outcome of all diagnostic and therapeutic interventions, especially as regards to older minors (adolescents)."

[76] Strode et al (2014) 46-9 opine that such a clause is also problematic as it conflicts with the Children's Act 38 of 2005 which recognises the evolving capacity of minors and allows them to consent to a range of health interventions before the age of 18. The legislation is also in conflict with the Department of Health 'National research guidelines' (2015) at 3.2.2.4, which allow for independent consent by children in certain circumstances where it may be "desirable" or "ethically justifiable" for a minor to "choose independently" whether to participate in health research.

These circumstances include:

- The risks of the research are minimal
- The child is older (i.e. older than 16)
- A REC has approved the approach

[77] Nienaber states that previously the age at which a child could consent independently to medical research was at 14 years of age. This was based on the Child Care Act 74 of 1983 in which the age for medical treatment was 14 and medical treatment was considered as analogous to medical research. Nienaber points out that by requiring children to obtain their parent's consent leads to the end of privacy for these children. Nienaber also states that the consent requirements are in sharp contrast to the Choice on Termination of Pregnancy Act 92 of 1996, which allows for a female to terminate her pregnancy at any age, and to section 129 of the Children's Act which lowers the age for medical treatment to 12 (lower than the 14 years of age prescribed by the Child Care Act): Nienaber (2013) 19-23.

[78] Nienaber states that this clause may present problems in that the "parents" or "guardian" of the child have to be found as without their consent the child may not participate in such research. This is as opposed to the previous Child Care Act which allowed a "custodian" of the child to consent in certain situations: Ibid.

[79] AE Strode and CM Slack (2015) state that a minor who shows understanding should consent with the parent or guardian providing proxy and should not merely assent to the study. The consent of the parent allows the child to choose. The parent or guardian cannot consent for the minor who is capable of choosing.

[80] Nienaber in Nienaber (2013) 19-23 states that no guidance is given as to how to assess understanding of the child. Thus, we have to rely on general legal and ethical rules. Nienaber states that capacity of the child must be assessed based on:

- To understand what he or she is consenting too.
- To choose decisively for or against participation of research.
- To communicate his or her choice.
- To accept the need for an intervention.

With regards to this section, it can be seen that the conditions placed on doing research on minors in a therapeutic setting are stricter[81] than those involving adults. Such research requires the approval of the parent or guardian, and minor if he/she can understand. The refusal process needs to also be dealt with as per the Department of Health National Health Guidelines (2015). The Guidelines in 3.2.2.2 state that the parent's and child's decision must be consistent. If the parent wants the child to participate in health research and the child refuses, the parent may not override such a decision.

In order to understand this legislation, the Regulations Relating to Research with Human Participants must be looked at in order to ascertain what conditions are prescribed as stated in Section 71(2)(b) thereof.

Firstly, the Regulations have a specific regulation dealing with research with human participants who are vulnerable. Regulation 4 states:
Research with vulnerable persons must:

a) Involve vulnerable persons only when non-vulnerable persons are not appropriate for inclusion.
b) Not systematically avoid inclusion of vulnerable persons because to do so is unfairly discriminatory and vulnerable persons are potential beneficiaries of relevant research;
c) Be responsive to the health needs and the priorities of vulnerable persons[82]; and
d) Receive special attention in ethical review to ensure that research-related risks are assessed and minimised and that appropriate consent procedures are followed.[83]

[81] AE Strode and CM Slack (2015) state that while these regulations require Research Ethics Committees to give special attention to research involving minors, they also emphasize that they may not be unjustifiably excluded from such research since they also may have to gain from such research being done. Therefore, the regulations call for Research Ethics Committees to balance child protection with research facilitation.
[82] Department of Health 'Health research guidelines' (2015) at 3.2.2.1(a) state that there should be equipoise in the clinical research. This means that there is uncertainty about whether an intervention works or not. The research into cognitive enhancers shows that such consensus has not been reached about these drugs and therefore such research would be allowed.
[83] Regulation 4 Regulations Relating to Research with Human Participants.

This regulation of the regulations poses no challenges either. It is trite that research to look for risks of cognitive enhancers in children would need child participants. Sub-regulation (b) and (c) encourages such research because it could lead to benefit for children and be classified as either “defensive” in that it would find out risks of those already taking such cognitive enhancers or to ascertain benefits that may be derived. Sub-regulation (d) is important as it recognises that children are vulnerable and thus the risks for them in such research must be minimised.

Sub-regulation 4.1 goes on to further deal with specific regulations for vulnerable persons that are children. The sub-regulation titled: “Research with minors should only take place when” states:

a) Adults are not appropriate research participants.
b) The research poses no more than a minimal risk to the minor; or
c) The research poses more than a minimal risk, but holds out the prospect of direct benefit to the minor; or
d) The research poses a minor increase over minimal risk and holds out no prospect of direct benefit to the minor but is anticipated to yield generalizable knowledge about the condition under study.

These regulations give us a broad atlas of routes to follow to argue for research of cognitive enhancers with children participants. Again, it is trite that adults would not be appropriate for such research. Sub-regulation (b) uses the term “minimal risk”. The regulations define “minimal risk” as: the probability and magnitude of harm or discomfort anticipated in the research is not greater than that ordinarily encountered in daily life in a stable society or in routine medical, dental, educational or psychological tests or examinations”. Given the side effects posed by cognitive enhancers[84] subsection (b) would not be able to be used. However, when it comes to the cognitive enhancer Modafinil, it may still pass muster as the research has shown that modafinil has nearly no side effects and significant benefits.[85]

[84] Detailed in the clinical chapter.
[85] Ibid.

Sub-regulation (c) poses the best option for getting research done. Under this regulation, even if there is a risk present[86], as long as there is the prospect of direct benefit to the minor, this risk is acceptable. Cognitive enhancers discussed in this thesis, being Methylphenidate, Adderall and Modafinil have been shown to offer benefits or to provisionally show benefits pending further research. It can thus be said that these drugs would offer the prospect of benefit to the participants in such research and the research would be able to be done under this regulation. Subsection "d" does not come into play because, as has already been stated, the research that is being dealt with here would be of a therapeutic nature.

6.7.2 Ethical Considerations concerning research on children

The concept of performing research on cognitive enhancers in children is not new. Research involving children and cognitive enhancers has been done before. There have been at least 7 studies done on the effects of caffeine on normal children.[87] Berg et al. opine that in certain circumstances and in certain instances the risks of an experimental pharmaceutical cognitive enhancer may outweigh the risks in certain populations.[88] There would have to be carefully thought out criteria regarding cognitive enhancers. The drug would have been tested extensively on adults and shown to have minimal side effects while shown to be extremely effective in its effects. This would be coupled with the belief that the drug would operate similarly in children and therefore would not be less safe or less effective in children.

A consideration specific to children is the ability of the parent or guardian to give informed consent for their children. Some parents may use this power to jeopardize their children's health in order to further their own ambitions or social status. However, parents are allowed to make decisions in how they want to bring up their children

[86] There is a catch herein that the "greater than minimal risk" is defined in the Department of Health 'Health research guidelines' (2015) at 3.2.2.1(b)(v) as "… should represent no more than a minor increase over minimal risk." It is accepted that using such a definition may make research on certain drugs such as Adderall unacceptable in healthy children.

[87] FX Castellanos and JL Rapoport 'Effects of caffeine on development and behavior in infancy and childhood: a review of the published literature' (2002) 40 *Food and Chemical Toxicology* 1235-42.

[88] JW Berg et al 'Making all the children above average: ethical and regulatory paediatricians in paediatric enhancement research' (2009) 48(5) *Clinical Paediatrics* 472-80 at 474.

including a say in which abilities and talents they want to maximize in their child. If a parent is able to enrol their child into an experimental learning program, then it is questionable as to why they shouldn't be allowed to enrol their children in a biomedical enhancement program if the risks are acceptable.[89] In order to allow for a parent to consent to enhancement research for their child, the child would also have to consent. This consent would matter less and the child's would matter more as the child increased in age and maturity.

6.8 Conclusion

This chapter has looked at the specific legal and ethical considerations that relate to doing research of cognitive enhancers on human participants, both adults and children. Two main parts of this chapter emerged. The first was whether it is ethical and legal to do such research on adults. It was seen that due to the principle of autonomy which is carried through ethics and South African Law an adult has full authority to give informed consent to participate in such research and for such research to be done.

The second part concerned the research of cognitive enhancers in children. Children are a special case because they are a vulnerable group whose best interests must be protected at all times. Ethically, there are two viewpoints. Some find it questionable to subject children to risks when there is no disease that is trying to be cured, however, the flip side is that children already participate in nonbiological studies that also entail enhancement and no ethical dilemma is noticed. The legal principles have shown that if there is a prospect of direct benefit to the children involved in the research then such research would also not be problematic even if there were risks involved. Therefore, there should be no problem for researchers to conduct research on cognitive enhancers in South Africa, both on adults and children.

The underlying theme throughout this thesis has been to investigate the legal and ethical environment that is present in society. The ethical and legal situation has been mapped out regarding cognitive enhancers. All that is left is to sum up what has been

[89] Ibid at 475.

found and present proposed legislation that would provide for pharmaceutical cognitive enhancer use in South Africa in a legal manner.

Chapter 7: Conclusion

Cognitive enhancers are available in our society. They are able to help us improve our cognitive abilities to levels that could not otherwise be achieved. These drugs give the user the power to enhance themselves. There are proponents and opponents of the use of such drugs. The critics believe that the use of non-natural means of enhancing should be forbidden as this will take away from what it means to be human while others have said that humans have always sought to enhance themselves using tools and cognitive enhancers are just the latest tool that is available.

This thesis has dealt with the three prescription drugs most used as cognitive enhancers, being: Methylphenidate, Adderall and Modafinil. By only using drugs already in existence allows for the analysis of such usage in the present and prevents merely hypothesise about drugs that may never come into being (although this research would also pertain to them as well). The research that has currently been performed on these drugs[1] has shown them to be safe in use. Furthermore, when used in their prescribed doses they do not pose a significant risk of harm or addiction. It can be seen that these drugs do cause enhancement of attention, concentration and memory. In order to ascertain further as to their actual effects and side effects would require further research which would be forthcoming once these drugs are approved for enhancement use. However, just because a tool is available does not necessarily mean one should use it. There are arguments for and against the use of cognitive enhancers.

In dealing with different arguments for and against cognitive enhancers, the Beauchamp-Childress principlist model was used. This model uses 4 principles to look at and judge ethical dilemmas. The principles being: autonomy, beneficence, non-maleficence and distributive justice allowed for a structured ethical analysis of the use of cognitive enhancers to be put forward. The ethical dilemmas relating to cognitive enhancers are vast, however, a few points were seen from the research. Autonomy allows for individuals to decide what they wish to put into their body and would allow

[1] See clinical chapter.

adults who wished to use cognitive enhancers to do so. Beneficence advocates for doctors to do good by their patients and help their patients live the best lives possible. If cognitive enhancers allow children and adults to perform at their best, then an argument could be made that doctors should help patients gain access to cognitive enhancers. The principle of non-maleficence is a bit trickier. To prevent harm from occurring to one's patients is sacrosanct in medicine dating back to the Hippocratic Oath. The limited information that is available on cognitive enhancers requires society to be wary about causing harm to people. The question becomes harder when dealing with children as society always has to do what is in the child's best interests. In this case, the unknown unknowns arising from a lack of research prohibits society from forming ethical and legal opinions. At the present state to allow children to use cognitive enhancers without understanding these risks may not be the best option. The best way to deal with this situation is to conduct more research to ascertain what the risks are of cognitive enhancers, which will allow us to have a more definitive answer. In conducting such research, one would also need to be careful not to hurt children. Many children are already using such drugs without any coercion in order to improve their marks and thus one could study them in order to come to a conclusion on the drugs' effects and side effects. Dubljevic has opined[2] that epidemiological research on this group would be legitimate whereas randomized controlled trials would not be. Justice was the last ethical principle discussed. However, it is crucial especially because of the inequality present in South Africa. One of the main questions that needs to be resolved is how to distribute cognitive enhancers so that all in society, especially the neediest can have access to them. In this sense, it was shown that the economic disincentives model (EDM) that was proposed allows for those who can afford cognitive enhancers to use them while feeding money back into the fiscus for increased public education, which is also a cognitive enhancer in the broader sense of the term.

Currently, cognitive enhancers are used off-label when prescribed by doctors to patients. Others may gain access to them through buying, trading or being given them by friends. This situation is legally dubious. Firstly, it means that doctors are prescribing these drugs to help some enhance whereas according to the current legal

[2] Private correspondence with Dubljevic dated 17/08/2018.

guidelines they may only prescribe to treat. Secondly, these drugs are highly regulated, even though Modafinil and Concerta have a very low risk of addictiveness or harm to patients. It has been argued that if adults want to enhance themselves then they should have the right to go to a doctor, pharmacist or any shop and be able to purchase such drugs. This allows them their autonomy to choose what goes into their bodies.

How to sell cognitive enhancers is a pertinent question. This thesis has discussed various models that could be used. There is a spectrum of such models going from Laissez-Faire to Prohibition. The way forward that would be best for South Africa is to use the Economics Disincentives Model (EDM), referred to by Dubljevic. This model is similar in nature to that already used for alcohol and tobacco in South Africa. The model also calls for licensing of those who wish to enhance making sure that they are giving informed consent[3] to their use of cognitive enhancers. The whole process would be funded by those wishing to use cognitive enhancers and therefore no money would be used from public funds. As Jungst has stated, what is medical necessity should define what the government must provide but other medical areas such as enhancement should be available to those willing to pay for it.

If the benefits and side effects of cognitive enhancers are to be understood to their fullest then much more research will still need to be done. In order to do such research, the ethical and legal implications have to be understood. Should people be allowed to participate in a study when they have no illness and yet may be exposed to harms? Adults, being autonomous beings, should be able to give informed consent to participating in such studies as they can decide for themselves based on the risks and benefits offered. The legal framework in South Africa was shown to allow research of enhancements both on adults and on children. On adults since they are autonomous and on children since there may be a benefit to the child that is involved in the study. These benefits are the potential cognitive enhancements that will allow the child to perform better at academics and anything that requires mental effort.

[3] Informed consent requires three parts: **information** which is turned into **knowledge**. **Consent** is given once the knowledge is gained.

The final part of the puzzle in this thesis is the Cognitive Enhancer Control Act which takes the research that was put forward and applies it to create a legal framework for the effective use of cognitive enhancers in society. The framework proposed would allow Methylphenidate, Adderall and Modafinil to be available to adults at any shop in the country. It then uses the EDM proposed by Dubljević to control how these drugs are accessed, priced and controlled.

It is clear from this thesis that a new framework will revolve around defining a concept of enhancement which will allow medical professionals to help patients to enhance not only their bodies through physical augmentation but also their minds through mental augmentation. Previous research referred to in chapter 1 showed that nootropics are already used in a widespread manner. The purpose of this thesis is not merely to look at and argue the ethical and legal problems pertaining to cognitive enhancer use in South Africa but rather to devise a strategy for their use in South Africa that complies with the society's legal and ethical requirements. In this regard, a legal framework is necessary so that the benefits of this new class of drugs may be used in the most efficient, healthy and beneficial way by society at large. Below the Cognitive Enhancer Control Act is put forward, which would be placed into the legislation. This would allow those who wish to use cognitive enhancers to be able to do so. This act takes all the outcomes gleamed in the previous chapters and dilutes it into practicable laws that are able to be applied to people's lives on a day to day basis. In the drafting of the said Draft Bill cognisance had to be taken of all the material presented previously. The reader will encounter proposed legislation that caters for all age groups of use of pharmaceutical cognitive enhancers in South Africa.

This Act will be the first to be proposed in South Africa to regulate the use of pharmaceutical cognitive enhancers. It is the culmination of the rest of this thesis in that it takes all that has been set out before and acts as a guide to making pharmaceutical cognitive enhancers legal in South Africa in order to allow the general population to have the choice as to whether they would like to use such pharmaceuticals in their daily lives.

7.1 Proposed act: Cognitive Enhancer Control Act

Preamble

To establish national norms and standards in order to allow for the sale and consumption of cognitive enhancers; to govern the advertising of cognitive enhancers to the public; to establish and govern the licensing procedure for the obtainment of cognitive enhancers; the informed consent processes that must be followed before such cognitive enhancers can be sold or bought; and to provide for matters connected therewith.

Chapter 1

Definitions and Interpretation

Definitions.—(1) In this Act, unless the context indicates otherwise—

'advertisement', in relation to any cognitive enhancer-

(a) means any commercial communication or action brought to the attention of any

member of the public in any manner with the aim, effect or likely effect of-

(i) promoting the sale or use of any cognitive enhancer, cognitive enhancer brand element or cognitive enhancer's manufacturer's name in relation to a cognitive enhancer; or

(ii) being regarded as a recommendation of a cognitive enhancer;

(b) includes product placement; and
(c) excludes commercial communication between a cognitive enhancer manufacturer or importer and its trade partners, business partners, employees and shareholders and any communications required by law,
and **'advertise'** has a corresponding meaning;

'brand element' includes the brand name, trademark, trade name, distinguishing guise, logo, graphic arrangement, design, slogan, symbol, motto, selling message, print, typeface, recognisable colour or pattern of colours, or any other symbol of product identification, that is likely to be taken as or confused with any brand of cognitive enhancer designed to promote cognitive enhancer use;

'cognitive enhancer' means any substance or mixture of substances used or purporting to be suitable for use or manufactured or sold for use of increasing the cognitive performance of an individual.

'importer' means any person who brings, or attempts to bring, a cognitive enhancer into the Republic for the purposes of selling that product, and **'import'** has a corresponding meaning;

'informed consent' as defined in section 6 and 7 of the National Health Act 61 of 2003 and section 129 of the Children's Act 38 of 2005.
'minor' means a person who has not attained the age of 18 years;

'manufacturer' where the manufacturer is-
a company, includes its holding company or any subsidiary and any subsidiary of its holding company;
an entity other than a company, includes an entity that controls or is controlled by such manufacturer or that is controlled by the same entity that controls such manufacturer;

'medicine' as defined in the Medicines and Related Substances Act 101 of 1965

'Minister' means the Minister of Health;

'organised activity'-

(a) means any activity or event-

(i) which any member of the public attends or in which he or she participates;

(ii) which is organised for the purposes of entertainment, sport or recreation or for educational or cultural purposes; and

(iii) where a cognitive enhancer, or brand name, trademark, logo or company name in relation to a cognitive enhancer, is used in the name of or portrayal of the activity or event to promote cognitive enhancer use; but

(b) excludes any event arranged by a manufacturer, importer, distributor or retailer of a cognitive enhancer where only its shareholders or its employees or their spouses or partners attend;

'package' means the container, receptacle or wrapper in which cognitive enhancers are sold, supplied or distributed at wholesale or at retail;

'prescribe' means prescribe by regulation under this Act;

'product placement' means the depiction of, or reference to, a cognitive enhancer or brand element in a broadcast programme, film, video recording, telecast or other electronic medium for which the producer, or any other person associated with the broadcast programme, film, video recording, telecast or other electronic medium, receives payment in cash or otherwise;

'promotion' is the practice of fostering awareness of and positive attitudes towards a cognitive enhancer, brand element or manufacturer for the purposes of selling the tobacco product or encouraging cognitive enhancer use, through various means, including direct advertisement, incentives, free distribution, entertainment, organised activities, marketing of brand elements by means of related events and products through any public medium of communication including cinematographic film, television production, radio production or the internet, and **'promote'** has a corresponding meaning;

‘SAHPRA’ means South African Health Products Regulatory Authority

'trade mark' includes-

(i) any mark whether registered or registrable for trade purposes or any recognised version thereof that is likely to be taken as, or confused with, that trade mark;

(ii) certification trade mark or collective trade mark; and

(iii) 'trade mark' as defined in section 1 of the Trade Marks Act, 1993 (Act 194 of 1993);

‘user’ is a natural person who uses cognitive enhancers

Chapter 2

2. Advertising, sponsorship, promotion, distribution, display and information required in respect of packaging and labelling of cognitive enhancer products

(1) *(a)* No person shall advertise or promote, or cause any other person to advertise or promote, a cognitive enhancer product through any direct or indirect means, including through sponsorship of any organisation, event, service, physical establishment, programme, project, bursary, scholarship or any other method.

(b) A commercial communication between a cognitive enhancer manufacturer or importer and its trade partners, business partners, employees and shareholders, must contain no other information except for factual information about the cognitive enhancer, its characteristics, its availability or price, pictures of the cognitive enhancers, the component parts and their packaging.

(2) No manufacturer, importer, distributor or retailer of cognitive enhancers shall-
(a) organise or promote any organised activity that is to take place in whole or in part in the Republic;

(b) make any financial contribution to any organised activity that is to take place, or is taking place, or has taken place in whole or in part in the Republic;

(c) make any financial contribution to any person in respect of-

(i) the organisation or promotion of any organised activity in the Republic by that person;

(ii) the participation, by that person, in any organised activity that is to take place, or is taking place in whole or in part, in the Republic.

(3) A manufacturer or importer of a cognitive enhancers may make a charitable financial contribution or sponsorship, provided that such contribution or sponsorship is not for the purpose of advertisement.

(4) No person shall package or label a cognitive enhancer product in any way that is false, misleading, deceptive or likely to create any erroneous, deceptive or misleading impression about its characteristics, properties, health effects, toxicity, composition, merit, safety, or side effects, including any term, descriptor, trade mark, figurative or other sign that directly or indirectly creates the impression that a particular cognitive enhancer is more or less effective than another cognitive enhancer.

(5) No person shall manufacture for sale in the Republic, import for subsequent sale or sell a cognitive enhancer-

(a) unless the cognitive enhancer is packaged in the prescribed manner; and

(b) in a package or containing a label that contains false or misleading information or that is calculated to deceive the user of such product.

(6) A wholesaler shall display a cognitive enhancer at his or her place of business in the prescribed manner.

(7) A retailer shall display-

(a) a notice in the prescribed manner in his or her place of business that contains the prescribed information regarding any cognitive enhancer available at his or her place of business; and

(b) a cognitive enhancer at his or her place of business in the prescribed manner and in such a way that no person shall be able to handle the cognitive enhancer before paying for it.

(8) No person shall sell or offer to sell cognitive enhancers at retail, unless the prescribed notices are displayed.

3. Packaging specific to cognitive enhancers

(1) A cognitive enhancer may not have the same packaging as when used for prevention or treatment of diseases and;

(2) A cognitive enhancer may not have the same trade name as when used for prevention or treatment of diseases.

Chapter 3

4. Designation of a medicine as a cognitive enhancer

(1) The Minister must designate a medicine as a cognitive enhancer only when recommended by the SAHPRA.

Chapter 4

5. Prohibitions in respect of cognitive enhancers

(1) No person shall sell any cognitive enhancer to any person:
(a) under the age of 18 years; or
(b) who does not have a cognitive enhancer licence; and
(c) proof of medical insurance for cognitive enhancer use.
(2) The owner or person in charge of any business shall ensure that no person under the age of 18 years in his or her employ or under his or her control, as the case may be, shall sell or offer to sell any cognitive enhancers on the business premises.
(3) *(a)* No person shall sell, offer to sell, supply, distribute or buy any cognitive enhancer through the postal services, the internet or any other electronic media. *(b)* The prohibition contained in paragraph *(a)* does not apply to any commercial communication between a cognitive enhancer manufacturer or importer and its trade partners, business partners, employees and shareholders.
(4) Subject to section 252A of the Criminal Procedure Act, 1977 (Act 51 of 1977), the Director-General may authorise in writing any person or class of persons to monitor compliance with this section in the prescribed manner.

Chapter 5

6. Use of Cognitive Enhancers by Minors

(1) The parent or guardian of a minor may supply to that minor cognitive enhancers to be consumed by the minor under the supervision of that parent or guardian.
(2) The parent or guardian of the minor in (1) must have a cognitive enhancer license
(3) A minor may refuse to take cognitive enhancers.

Chapter 6

7. Pricing of cognitive enhancers

(1) A cognitive enhancer must be priced according to the price of the medicine as provided by the single exit price of the medicine price registry as defined in Section 22G of the Medicines and Related Substances Act 101 of 1965; and
(2) A cognitive enhancer tax to be determined by the Minister must be placed on cognitive enhancers.
(3) The monies raised from the tax set out in (2) must be used for public healthcare and public education.

Chapter 7

8. Free distribution and reward prohibited

(1) No manufacturer, distributor, importer or retailer of a cognitive enhancer, or any person or agent acting on behalf of a manufacturer, distributor, importer or retailer, shall for free, or at a reduced price, other than a normal trade discount -

(a) distribute any cognitive enhancer; or

(b) supply any cognitive enhancer to any person for subsequent distribution.

(2) No person shall offer any gift, cash rebate or right to participate in or attend any contest, lottery or game, or any sporting, cultural, social or recreational event, to any

person in consideration of the purchase of a tobacco product, or the furnishing of evidence of such a purchase, or the confirmation of use of a cognitive enhancer.

Chapter 8

9. Medical Insurance for users of cognitive enhancers

(1) A user of cognitive enhancers must be insured in terms of a medical scheme for cognitive enhancer use.
(2) The user must have the insurance as stated in (1) for at least 3 months before applying for a licence for cognitive enhancers as set out in Section 6.

Chapter 9

10. Licensing of users of cognitive enhancers

(1) A user of cognitive enhancers must first obtain a licence for the use of cognitive enhancers before he or she may purchase such; and
(2) Must have medical insurance for cognitive enhancer use.
(3) The licencing procedure is to be defined by the Minister in such regulations as the Minister makes.
(4) A licence may only be obtained by a person over the age of 18 years.

Chapter 10

11. Regulations

(1) The Minister may make regulations regarding-

(a) anything that must or may be prescribed in terms of this Act;

(b) the signs in respect of cognitive enhancers and the information that must be displayed at points of sale, including-

(i) health warnings that must appear on the signs;

(ii) size and format of the signs;

(iii) location of the signs; and

(c) information that must be displayed on a package containing a cognitive enhancer and on an enclosed leaflet, picture or pictogram, including-

(i) information about the product;

(ii) effects and side effects arising from the use of the product;

(iii) information that may not appear on packages; and

(iv) the descriptors, package design characteristics, graphics or terms considered to be false, misleading, deceptive or likely to create any erroneous impression;

(d) the location, content, size and format of any sign required in terms of this Act;

(e) the standards that a cognitive enhancer must comply with, including-

(i) the amounts of substances that may be contained in the product;

(ii) substances that may or may not be added to the product;

(iii) product design and composition;

(f) methods to assess conformity, and methods of testing and measuring compliance, with any prescribed standard;

(g) subject to Chapter 2 of the Constitution of the Republic of South Africa, 1996, any information that a manufacturer or importer of a cognitive enhancer must submit to the Minister and to the public, including information in respect of-

(i) research conducted into a cognitive enhancer by a manufacturer or by a person who conducted research paid for in whole or in part by a cognitive enhancer manufacturer;

(ii) the quantity of a cognitive enhancer manufactured or imported, as the case may be;

(iii) marketing expenditure; and

(iv) information on product composition, ingredients, side effects; and

(h) any ancillary or incidental administrative or procedural matter that it is necessary to prescribe for the proper implementation or administration of this Act.

(3) The Minister shall, not less than three months before issuing any regulation under this Act, cause a draft of the regulation to be published in the *Gazette*, together with a notice declaring his intention to issue such a regulation and inviting interested persons to furnish him with any comments thereon or representations in connection therewith within a specified period.

(4) The provisions of subsection (3) shall not apply in respect of-

(a) a regulation which, after the provisions of the said subsection have been complied with, has been amended by the Minister in consequence of comments or representations received by him in pursuance of the notice published in terms of the said subsection;

(b) any regulation in respect of which the Minister is of the opinion that it is in the public interest that it be issued without delay.

Chapter 11

12. Exemptions

The Minister may by notice in the *Gazette* exempt any cognitive enhancer from a provision of this Act on such conditions as the Minister may determine in the notice, provided that it is in the public interest for the particular cognitive enhancer to be so exempted.

Chapter 12

13. Offences and penalties

(1) Any person who contravenes or fails to comply with this act will be liable or contravenes or fails to comply with any regulation made in terms of this Act, shall be guilty of an offence and liable on conviction to a fine. The fine to be paid will depend on the offence committed and will be stated in regulations made by the Minister of Health before this Act becomes enforceable.

Chapter 13

14. Short title and commencement

(1) This Act shall be called the Cognitive Enhancer Control Act, 2018, and shall come into operation on a date fixed by the State President by proclamation in the Gazette.
(2) Different dates may under subsection (1) be fixed in respect of different provisions of this Act.

7.2 Final remarks

This thesis should not be seen as the end of a discussion but rather just the end of the beginning of a discussion. The medical world as with the rest of the world continually moves at a magnificent pace and it would be foolish to try and predict what may appear next on the horizon. However, today these cognitive enhancers are already available, and it is pertinent that an attempt is made to allow them to be used in the most effective way. This will firstly stop the current black-market buying and selling of such drugs while secondly allowing those who wish to start or continue to use such drugs to do so. Cognitive enhancers will continually be sought out by individuals because a knowledge-based society awards those with cognitive skills that are greater than others. Three drugs were mentioned in this thesis that are used as cognitive enhancers. Yet, others are on the horizon. A drug class known as Ampakines has shown promise as perhaps the next place where a new cognitive enhancer will emerge

from.[4] The aim of this thesis has been to contribute to the discussion and allow South African society to come to terms with these drugs for the benefit of all. A final thought as to the importance of such regulation at this early stage in pharmaceutical cognitive enhancer development can be found in the words of David Collingridge who articulated what has become known as the Collingridge dilemma[5]. His idea was that society can regulate a new technology successfully when it is still young and unpopular, however at this stage it may still be hiding its unanticipated and undesirable consequences. Society could otherwise use a wait and see approach to ascertain these consequences, however this will risk losing control over the regulation of the technology as it becomes more pervasive.[6] It is to be seen which society will adopt in connection with pharmaceutical cognitive enhancers.

[4] ScienceDirect 'Ampakines' https://www.sciencedirect.com/topics/neuroscience/ampakines (Accessed on 3 October 2018); RespireRx Pharmaceuticals 'RespireRx pharmaceuticals inc. announces publication of ampakine data https://globenewswire.com/news-release/2018/07/25/1541938/0/en/RespireRx-Pharmaceuticals-Inc-Announces-Publication-of-Ampakine-Data.html (Accessed on 3 October 2018).

[5] D Collingridge *The Social Control of Technology* (1980): "When change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult, and time-consuming."

[6] E Morozov 'The Collingridge dilemma' in J Brockman (ed) *This explains everything* (2013).

Bibliography

Online resources and articles

- Anderson R. Why cognitive enhancement is in your future (and your past). *The Atlantic.* February 6, 2012.
- Breaking 2. https://www.nike.com/za/en_gb/c/running/breaking2
- Centre for Disease Control and Prevention (CDC) 'Health effects of cigarette smoking' https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm
- Cherwell. Revealed: Oxford's addiction to study drugs. https://cherwell.org/2016/05/13/revealed-oxfords-addiction-to-study-drugs/
- Concerta Prescribing Information https://www.concerta.net/pdfs/Prescribing_Info-short.pdf
- Constitutional Court of South Africa. https://www.concourt.org.za/index.php/children-s-rights
- Drugs.com Ritalin dosage. https://www.drugs.com/dosage/ritalin.html
- A Edney 'U.S. to make more drugs easily available, cutting role docs play' https://www.bloombergquint.com/business/2018/07/17/u-s-to-make-more-drugs-easily-available-cutting-role-docs-play#gs.4Wxnc7s
- Fabiano A 'Cognitive enhancement, legalising opium, and cognitive biases' http://blog.practicalethics.ox.ac.uk/2014/11/cog_enhancement_biases/
- FDA Approved Labelling. Provigil (Modafinil) tablets 17 August 2007. https://www.accessdata.fda.gov/drugsatfda_docs/label/2007/020717s020s013s018lbl.pdf.
- W Glannon (2015) *Cognitive enhancement* available at: http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199935314.001.0001/oxfordhb-9780199935314-e-43
- HPCSA Overview https://www.hpcsa.co.za/About
- Katz J, Quealy K. Nike Says Its $250 Running Shoes Will Make You Run Much Faster. What if That's Actually True?

https://www.nytimes.com/interactive/2018/07/18/upshot/nike-vaporfly-shoe-strava.html

- Lexico. https://www.lexico.com/en/definition/
- Mehlman, MJ 'Off-label prescribing' (2005) http://www.thedoctorwillseeyounow.com/content/bioethics/art1971.html
- Merriam-Webster https://www.merriam-webster.com/dictionary/
- A Rathi 'The world's first true smart drug enhances cognition and is deemed safe by health experts' https://qz.com/485020/the-worlds-first-true-smart-drug-enhances-cognition-and-is-deemed-safe-by-health-experts/
- RespireRx Pharmaceuticals 'RespireRx pharmaceuticals inc. announces publication of ampakine data https://globenewswire.com/news-release/2018/07/25/1541938/0/en/RespireRx-Pharmaceuticals-Inc-Announces-Publication-of-Ampakine-Data.html
- ScienceDirect 'Ampakines' https://www.sciencedirect.com/topics/neuroscience/ampakines
- Schwarz A. (2012). "Attention Disorder or Not, Pills to Help in School" New York Times https://www.nytimes.com/2012/10/09/health/attention-disorder-or-not-children-prescribed-pills-to-help-in-school.html
- Schwarz, A. (2013). "Drowned in a Sea of Prescriptions" New York Times, February 2. http://www.nytimes.com/2013/02/03/us/concerns-about-drug-practicesandamphetamine-addiction.html
- The Economist 7 January 2018 'South Africa has one of the world's worst education systems' https://www.economist.com/middle-east-and-africa/2017/01/07/south-africa-has-one-of-the-worlds-worst-education-systems
- The Oxford English Dictionary Online https://en.oxforddictionaries.com/definition/
- The World Anti-Doping Code: International Standard Prohibited List. World Anti-Doping Agency. (2017) https://www.wada-ama.org/sites/default/files/resources/files/2016-09-29_-_wada_prohibited_list_2017_eng_final.pdf
- The World Bank in South Africa. http://www.worldbank.org/en/country/southafrica/overview

- Viljoen A 'Dagga medicine legal by April?' https://www.news24.com/SouthAfrica/News/dagga-medicine-legal-by-april-20161124
- WADA Doping Control Officer's Training Tool Kit Manual May 2011 at https://www.wada-ama.org/sites/default/files/resources/files/wada_dco_toolkit_v3_full_en.pdf
- World Health Organization 'Mental health: a state of well-being' http://www.who.int/features/factfiles/mental_health/en/

Journal Articles

- Abikoff, H et al 'Symptomatic improvement in children with ADHD treated with long-term methylphenidate and multimodal psychosocial treatment' *Journal of the American Academy of Child and Adolescent Psychiatry* 43(7): 802, 2004
- Advokat, C 'What are the cognitive effects of stimulant medication? emphasis on adults with attention-deficit/hyperactivity disorder' *Neuroscience and Biobehavioral Reviews* 34: 1256, 2010
- Agar, N 'A Question about defining moral bioenhancement' *Journal of Medical Ethics* 40: 369, 2014a
- American Academy of Pediatrics Committee on Bioethics 'Informed consent, parental permission, and assent in paediatric practice' *Pediatrics* 95(2): 314, 1995
- Appel, JM 'When the boss turns pusher: a proposal for employee protections in the age of cosmetic neurology' *Journal of Medical Ethics* 34(8): 616, 2008
- Arshagouni, P 'But I'm an adult now…sort of – adolescent consent in health care decision making and the adolescent brain *Journal of Health Care Law and Policy* 9:315, 2006
- Bahji, A and Stephenson, C 'International Perspectives on the Implications of Cannabis Legalization: A Systematic Review & Thematic Analysis' International Journal of Environmental Research and Public Health 16: 3095, 2019
- Banjo, OC et al 'Physician attitudes towards pharmacological cognitive enhancement: safety concerns are paramount' *PLOS One* 5(12): e14322, 2010

- Bastuji H and Jouvet M ‘Successful treatment of idiopathic hypersomnia and narcolepsy with modafinil’ *Progress in Neuro-Psychopharmacology and Biological Psychiatry* 12(5): 695–700, 1988
- Battleday RM, Brem AK ‘Modafinil for cognitive neuroenhancement in healthy non-sleep deprived subjects: A systematic review’ *European Neuropsychopharmachology* 25(11): 1165, 2015
- Bell, SK et al ‘Lessons for enhancement from the history of cocaine and amphetamine use’ *AJOB Neuroscience* 3: 24, 2012
- Bell, S et al ‘Australian university students’ attitudes towards the acceptability and regulation of pharmaceuticals to improve academic performance’ *Neuroethics* 6(1): 197, 2013
- Berg, JW et al ‘Making all the children above average: ethical and regulatory paediatricians in paediatric enhancement research’ *Clinical Paediatrics* 48(5): 472, 2009
- Bergström, LS and Lynoe, N ‘Enhancing concentration, mood and memory in healthy individuals: an empirical study of attitudes among general practitioners and the general population’ *Scandinavian Journal of Public Health* 36: 532, 2008
- Berlan, ED and Bravendar T ‘Confidentiality, consent, and caring for the adolescent population’ *Current Opinion in Paediatrics* 21: 450, 2009
- Berman, S.M et al ‘Potential adverse effects of amphetamine treatment on brain and behavior: a review’ *Molecular Psychiatry* 14 (2): 123, 2009
- Boot, BP et al ‘Better evidence for safety and efficacy is needed before neurologists prescribe drugs for neuroenhancement to healthy people’ *Neurocase* 18: 181, 2012
- Bostrom, N ‘Drugs can be used to treat more than disease’ *Nature* 451: 520, 2008
- Bostrom, N and Ord, T ‘The reversal test: eliminating status quo bias in applied ethics’ *Ethics* 116(4): 656, 2006
- Bostrom, N and Sandberg A ‘Cognitive enhancement: methods, ethics, regulatory challenges *Science and Engineering Ethics* 15: 311, 2009
- Bostrom, N and Roache, R ‘Ethical issues in human enhancement’ *Nanoethics* 2(3): 317, 2008

- Buchannan, A ‘Cognitive enhancement and education’ *Theory and Research in Education* 9(2): 145, 2011
- Butcher, J ‘Cognitive enhancement raises ethical concerns. Academics urge pre-emptive debate on neuro- technologies’ *Lancet* 362: 132, 2003
- Buthelezi MC and Reddi M ‘The framework convention on tobacco control measures: does South Africa measure up?’ (2003) 28(2) *Journal for Juridical Science* 175-198
- Caplan, A ‘Is better best?’ *Scientific American* 289: 104, 2003
- Capps, B ‘Libertarianism, legitimation, and the problems of regulating cognition-enhancing drugs’ *Neuroethics* 4(2): 119, 2011
- Carstens P. Revisiting the infamous pernkopf anatomy atlas: historical lessons for medical law and ethics *Fundamina* 18(2): 23-49, 2012
- Castaldi, S et al ‘*Use of cognitive enhancement medication among Northern Italian University students*’ *Journal of Addiction Medicine* 6: 112, 2012
- Castellanos FX and Rapoport JL ‘Effects of caffeine on development and behavior in infancy and childhood: a review of the published literature’ (2002) 40 *Food and Chemical Toxicology* 1235-42
- Castle, L et al ‘Trends in medication treatment for ADHD’ *Journal of Attention Disorders* 10: 335, 2007
- Caulkins, JP et al ‘Basing drug scheduling decisions on scientific ranking of harmfulness: false promise from false premises’ *Addiction* 106: 1886, 2011
- Caviola, L et al ‘Cognitive biases can affect moral intuitions about cognitive enhancement’ *Frontiers in Systems Neuroscience* 8: 195, 2014
- Caviola, L and Faber, NS ‘Pills or push-ups? effectiveness and public perception of pharmacological and non-pharmacological cognitive enhancement’ *Frontiers in Psychology* 6: 1852, 2015
- Chaskalson A ‘Human dignity as a foundational value of our constitutional order’ *SAJHR* 16: 193, 2000
- Chatterjee, A ‘Cosmetic neurology: the controversy over enhancing movement, mentation and mood’ *Neurology* 63: 968, 2004
- Chatterjee, A ‘The promise and predicament of cosmetic neurology’ *Journal of Medical Ethics* 32(2): 110, 2006

- Chatterjee, A ‘Cosmetic neurology and cosmetic surgery: parallels, predictions and challenges’ *Cambridge Quarterly Healthcare Ethics* 16: 129, 2007
- Chatterjee, A ‘Framing pains, pills, and professors’ *Expositions* 2(2): 139, 2008b
- Chatterjee, A ‘A medical view of potential adverse effects’ *Nature* 457: 532, 2009
- Cohen, Y et al ‘Methylphenidate use among medical students at Ben-Gurion University of the Negev’ *Journal of Neuroscience Rural Practice* 6(3): 320, 2015
- Conrad, P. and Bergey, MR ‘The impending globalization of ADHD: notes on the expansion and growth of a medicalised disorder’ *Social Science & Medicine* 122: 31, 2014
- Daniels, N ‘Normal functioning and the treatment-enhancement distinction’ *Cambridge Quarterly Healthcare Ethics* 9: 309, 2000
- De Jongh, R et al ‘Botox for the brain: enhancement of cognition, mood and pro-social behavior and blunting of unwanted memories’ *Neuroscience and Biobehavioural Reviews* 32(4): 760, 2008
- De Santis, AD et al ‘Illicit use of prescription ADHD medications on a college campus: a multimethodological approach’ *Journal of American College Health* 57(3): 315, 2008
- Dietz, P et al ‘Randomized response estimates for the 12-month prevalence of cognitive-enhancing drug use in university students’ *Pharmacotherapy* 33(1): 44, 2013
- Diller HL ‘The Run on Ritalin: Attention Deficit Disorder and Stimulant Treatment in the 1990s’ *Hastings Center Report* 26(2): 12-18, 1996
- Dodge, T et al ‘Judging cheaters: is substance misuse viewed similarly in the athletic and academic domains?’ *Psychology of Addictive Behaviors* 26(3): 678, 2012
- Dubljevic, V ‘Principles of justice as the basis for public policy on psychopharmacological cognitive enhancement’ *Law, Innovation and Technology* 4(1): 67, 2012
- Dubljevic V ‘Toward a legitimate public policy on cognition-enhancement drugs’ *AJOB Neuroscience* 3(3): 29, 2012

- Dubljević, V ‘Cognitive enhancement, rational choice and justification’ *Neuroethics* 6(1): 179, 2013a
- Dubljević, V ‘Autonomy in neuroethics: political and not metaphysical’ *AJOB Neuroscience*, 4(4): 44, 2013c
- Dubljevic, V ‘Prohibition or coffee shops: regulation of amphetamine and methylphenidate for enhancement use by healthy people’ *The American Journal of Bioethics* 13(7): 23, 2013
- Dubljević, V et al ‘Cognitive enhancement and academic misconduct: a study exploring their frequency and relationship’ *Ethics and Behavior* 24(5): 408, 2014
- Dubljević V ‘Toward an improved multi-criteria drug harm assessment process and evidence-based drug policies’ (2018) 9 *Frontiers in Pharmacology* 898.
- Dunlop, M and Savulescu, J ‘Distributive justice and cognitive enhancement in lower, normal intelligence’ *Monash Bioethical Review* 32(3-4): 189, 2014
- Earp, BD et al ‘When is diminishment a form of enhancement? rethinking the enhancement debate in biomedical ethics’ *Frontiers of Systems Neuroscience* 8: 12, 2014
- Elliott, C ‘American bioscience meets the American dream’ *The American Prospect* 14: 38, 2003a
- Elliott, C ‘Enhancement technologies and the modern self’ *Journal of Medicine and Philosophy* 36: 364, 2011
- Emanuel, EJ and Emanuel, LL ‘Four models of the physician–patient relationship’ *Journal of the American Medical Association* 267: 2221,1992
- Engelhardt, HT ‘The disease of masturbation: values and the concept of disease’ *Bulletin of the History of Medicine* 48: 234, 1974
- Faber, NS et al ‘Cognitive enhancement and motivation enhancement – an empirical comparison of intuitive judgements’ *AJOB Neuroscience* 13: 18, 2015
- Fallah, G et al ‘Stimulant use in medical students and residents requires more careful attention’ *Caspian Journal of Internal Medicine* 9(1): 87, 2018
- Farah, MJ et al ‘Neurocognitive enhancement: what can we do and what should we do?’ *Nature Reviews Neuroscience* 5: 421, 2004
- Farah, MJ et al ‘When we enhance cognition with adderall, do we sacrifice creativity? a preliminary study’ *Psychopharmacology* 202: 541, 2008

- Farah, MJ ‘Overcorrecting the neuroenhancement discussion’ *Addiction* 106: 1190, 2011
- Farah, MJ et al ‘Cognitive enhancement’ *Wiley Interdisciplinary Reviews: Cognitive Science* 5: 95, 2014
- Farah, MJ ‘The unknowns of cognitive enhancement’ *Science* 350(6259) 379, 2015
- Faulmüller, N et al ‘The indirect psychological costs of cognitive enhancement’ *American Journal of Bioethics* 13(7): 45, 2013
- Fenton, E ‘The perils of failing to enhance’ *Journal of Medical Ethics* 36: 148, 2010
- Findling, RL et al ‘Short-term cardiovascular effects of methylphenidate and adderall’ *Journal of the American Academy of Child and Adolescent Psychiatry* 40(5): 525, 2001
- Fischer B and Kendall P ‘Nutt et. al.’s harm scales for drugs – room for improvement but better policy based on science with limitations than no science at all’ *Addiction* 106(11): 1891–2, (2011)
- Fitz, N et al ‘Public attitudes toward cognitive enhancement’ *Neuroethics* 7(2): 173, 2014
- Flaskerud, JH ‘American culture and neuro-cognitive enhancing drugs’ *Issues in Menta; Health Nursing* 31(1): 62, 2010
- Flanigan, J ‘Adderall for all: a defense of paediatric neuroenhancement’ *HEC Forum* 25: 325, 2013
- Fleishmann, A and Kaliski, A ‘Personal autonomy and authenticity: adolescents’ discretionary use of methylphenidate’ *Neuroethics* 10(4): 419, 2017
- Flisher, AJ and Hawkridge, S ‘Attention deficit hyperactivity disorder in children and adolescents’ *South African Journal of Psychiatry* 19(3): 136, 2013
- Forlini, C and Racine, E ‘Disagreements with implications: diverging discourses on the ethics of the non-medical use of methylphenidate for performance enhancement’ *BMC Medical Ethics* 10: 9, 2009
- Forlini C and Racine E ‘Stakeholder perspectives and reactions to “academic” cognitive enhancement: unsuspected meaning of ambivalence and analogies’ *Public Understanding of Science* 21(5): 606, 2012

- Forlini, C et al ‘Navigating the enhancement landscape: ethical issues in research on cognitive enhancers for healthy individuals’ *EMBO reports* 14(2): 123, 2013
- Forlini, C et al ‘Should physicians prescribe cognitive enhancers to healthy individuals?’ *Canadian Medical Association Journal* 185: 1047, 2013
- Frank, RH et al ‘Does studying economics inhibit cooperation?’ *The Journal of Economic Perspectives* 7(2): 159, 1993
- Franke, AG et al ‘Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany’ *Pharmacopsychiatry* 44: 60, 2011
- Franke, AG et al ‘Methylphenidate, modafinil, and caffeine for cognitive enhancement in chess: a double-blind, randomised controlled trial’ European Neuropsychopharmacology. 27(3) 248, 2017
- Fulgoni VL Trends in intake and sources of caffeine in the diets of U.S. Adults: 2001–2010 *American Journal of Clinical Nutrition* 101(5): 1081-1087, 2015
- Gaucher, N et al ‘Cognitive enhancement in children and adolescents: is it in their best interests?’ *Acta Paediatrica* 102: 1118, 2013
- Gilleen, J et al ‘Modafinil combined with cognitive training is associated with improved learning in healthy volunteers – a randomized controlled trial’ *European Neuropsychopharmacology* 24(4): 529, 2014
- Glannon, W ‘Psychopharmacological enhancement’ *Neuroethics* 1(1): 45, 2008
- Goldman, LS et al ‘Diagnosis and treatment of attention-deficit/hyperactivity disorder in children and adults’ *Journal of the American Medical Association* 279: 1100, 1998
- Goodman, R ‘Cognitive enhancement, cheating, and accomplishment’ *Kennedy Institute of Ethics Journal* 20: 145, 2010
- Gottfredson, LS ‘Why g matters: the complexity of everyday life’ *Intelligence* 24: 79, 1997
- Graf, WD et al ‘Paediatric neuroenhancement: ethical, legal, social, and neurodevelopmental implications’ *Neurology* 80(13): 1251, 2013
- Greely, HT et al ‘Towards responsible use of cognitive-enhancing drugs by the healthy’ *Nature* 456(7223): 702, 2008
- Greely, HT ‘Enhancing brains: what are we afraid of?’ *Cerebrum* July 14, 2010

- Greenberg, LM and Yellin, AM 'Blood pressure and pulse changes in hyperactive children treated with imipramine and methylphenidate' *American Journal of Psychiatry* 132(12):1325, 1975
- Grisso, T and Vierling, L 'Minor's consent to treatment: a developmental perspective' *Professor of Psychology* 9: 412, 1978
- Haile, DW et al 'Effects of EPO on blood parameters and running performane in Kenyan athletes' *Medicine and Science in Sport and Exercise* 51(2): 299-307, 2019
- Hall, W 'Feeling better than well' *EMBO Reports* 5(12): 1105, 2004
- Hall, WD and Lucke, JC 'The enhancement use of neuropharmaceuticals: more scepticism and caution needed' *Addiction* 105(12): 2041, 2010
- Harris, J, and Quigley, M 'Humans have always tried to improve their condition' *Nature* 451(7178) : 521, 2008
- Hart, SA et al 'Exploring how ADHD symptoms are related to reading and mathematics performance: general genes, general environments' *Psychological Science* 21: 1708, 2010
- Helitzer, DL et al 'The "ins" and "outs" of provider-parent communication: perspectives from adolescent primary care providers on challenges to forging alliances to reduce adolescent risk' *Journal of Adolescent Health* 48: 404, 2011
- Hesslow, G 'Do we need a concept of disease' *Theoretical Medicine* 14(1): 1, 1993
- Heinz, A et al 'Cognitive neuroenhancement: false assumptions in the ethical debate' *Journal of Medical Ethics* 38(6): 372, 2012
- Henry, V 'Off-label prescribing' *Journal of Legal Medicine* 20(3): 365, 1999
- Himonga, C and Cooke, A 'A Child's Autonomy with Special Reference to Reproductive Medical Decision-making in South African law: Mere Illusion or Real Autonomy?' *IJCR* 15(3): 323-363, 2007
- Hoogkamer, W et al 'A Comparison of the Energetic Cost of Running in Marathon Racing Shoes**'** Sports Medicine 48(4): 1009-1019, 2018
- Hotze, T et al 'Doctor, would you prescribe a pill to help me...? A national survey of physicians on using medicine for human enhancement' *American Journal of Bioethics* 11(1): 3, 2011

- Husain, M and Mehta, MA ‘Cognitive enhancement by drugs in health and disease’ *Trends in Cognitive Science* 15(1): 28, 2011
- Hyman, SE ‘Cognitive enhancement: promises and perils’ *Neuron* 69(4): 595, 2011
- Ilieva, I and Farah MJ ‘Cognitive enhancement with amphetamine: history repeats itself’ *AJOB Neuroscience* 4(1): 24, 2013
- Ilieva, I et al ‘Objective and subjective cognitive enhancing effects of mixed amphetamine salts in healthy people’ *Neuropharmacology* 64: 496, 2013
- Ilieva, I and Farah, MJ ‘Enhancement stimulants: perceived motivational and cognitive advantages’ *Frontiers in neuroscience* 7: 198, 2013
- Ilieva, IP and Farah, MJ ‘Attention, motivation and study habits in users of unprescribed ADHD medication’ *Journal of Attention Disorders* 23(2) 149, 2019
- Iuculano, T and Cohen Kadosh, R ‘The mental cost of cognitive enhancement’ *The Journal of Neuroscience* 33(10): 4482, 2013
- Jain, R et al ‘Non-Medical use of methylphenidate among medical students of the University of the Free State’ *South African Journal of Psychiatry* 23: a1006, 2017
- Jansen, RM ‘The off-label use of medication in South Africa – what about some information for medical practitioners?’ *South African Medical Journal* 99(6): 438, 2009
- Kadlac, A ‘The challenge of authenticity: enhancement and accurate self-presentation’ *Journal of Applied Philosophy* 35(4): 790, 2018
- Khushf, G ‘The use of emergent technologies for enhancing human performance: are we prepared to address the ethical and policy issues?’ *Public Policy and Practice* 4(2): 1, 2005
- Kim, Y et al ‘Methylphenidate induced dendritic spine formation and DFosB expression in nucleus accumbens’ *Proceedings of the National Academy of Sciences of the USA* 106: 2915, 2009
- Kociancic, T et al ‘Evaluation of risks associated with short- and long-term psychostimulant therapy for treatment of ADHD in children’ *Expert Opinion on Drug Safety* 3(2): 97, 2004
- Koren, G et al ‘Maturity of children to consent to medical research: The babysitter test’ *Journal of Medical Ethics* 19(3): 142, 1993

- Kroutil, LA et al ‘Nonmedical use of prescription stimulants in the United States’ *Drug and Alcohol Dependence* 84(2): 135, 2006
- Krutzinna, J ‘Can a welfarist approach be used to justify a moral duty to cognitively enhance children?’ *Bioethics* 30(7): 528, 2016
- LaBuzetta, JN ‘Moving beyond methylphenidate and amphetamine: The ethics of a better “smart drug”’ *American Journal of Bioethics* 13(7): 43, 2013
- Larriviere, D et al Responding to requests from adult patients for neuroenhancements: guidance of the ethics, law and humanities committee’ *Neurology* 73(17): 1406, 2009
- Larriviere, D and Williams MA. Neuroenhancement: wisdom of the masses or “false phronesis”? Clinical Pharmacology & Therapeutics 88(4): 459, 2010
- Launis, V ‘Cosmetic neurology: sliding down the slippery slope?’ *Cambridge Quarterly of Healthcare Ethics* 19: 218, 2010
- Leikin, S ‘A proposal concerning decisions to forgo life-sustaining treatment for young people’ *Journal of Paediatrics* 115(1): 17, 1989
- Lengvenyte A and Strumila R ‘Use of cognitive enhancers among medical students in Lithuania’ (2016) 33(2) *Nordic Studies on Alcohol and Drugs* 173-87.
- Levy, N ‘Enhancing authenticity’ *Journal of Applied Philosophy* 28(3): 308, 2011
- Lindsay, SE et al ‘Use of modafinil for the treatment of attention deficit/hyperactivity disorder’ *Annals of Pharmacotherapy* 40(10): 1829, 2006
- Lucke JC et al ‘Weak evidence for large claims contribute to the phantom debate’ *BioSocieties* 5: 482, 2010
- Lucke JC et al ‘Deflating the neuroenhancement bubble’ *AJOB Neuroscienc*e 2(4): 38, 2011
- Lynch, G et al *‘The likelihood of cognitive enhancement’ Pharmacological and Biochemical Behaviour* 99(2): 116, 2011
- Maher, B ‘Poll results: look who’s doping’ Nature 452(7188): 674, 2008
- Mache, S et al ‘Cognitive-enhancing substance use at German universities: frequency, reasons and gender differences’ *Wiener Medizinische Wochenschrift* 162(11-12): 262, 2012
- Mahoney CR et al. Intake of caffeine from all sources and reasons for use by college students. *Clinical Nutrition* 38: 668-675, 2019

- Makridis, C ‘Converging technologies: a critical analysis of cognitive enhancement for public policy application’ *Science and Engineering Ethics* 19(3): 1017, 2010
- McCabe, SE et al ‘The use, misuse and diversion of prescription stimulants among middle and high school students’ *Substance Use and Misuse*. 39(7): 1095-1116, 2004
- McCabe, SE et al. ‘Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey *Addiction* 100(1): 96, 2005
- McCabe, SE et al ‘Trends in medical use, diversion, and non-medical use of prescription medications among college students from 2003 to 2013: connecting the dots’ *Addictive Behaviors* 39(7): 1176, 2014
- McQuoid-Mason, D Parental refusal of blood transfusions for minor children solely on religious grounds – the doctors dilemma resolved South African Medical Journal 95(1): 29-30, 2005
- Mehlman, MJ ‘Cognition-enhancing drugs’ *Milibank Quarterly* 82(3): 483, 2004
- Mehlman, MJ et al ‘Ethical and legal Issues in enhancement research on human subjects’ *Cambridge Quarterly Healthcare Ethics* 20(1): 30, 2011
- Menuz, V et al ‘Is human enhancement also a personal matter?’ *Science and Engineering Ethics* 19(1): 161, 2013
- Mitchell, DC et al ‘Beverage caffeine intake in the US’ *Food and Chemical Toxicology* 63: 136, 2014
- Mohamed, AD ‘Modafinil has the potential for addiction’ *AJOB Neuroscience* 3(2): 36, 2012a
- Mohamed, AD and Sahakian, BJ ‘The ethics of elective psychopharmacology’ *International Journal of Neuropsychopharmacology* 15(4): 559, 2011
- Moreno, JD ‘DARPA on your mind’ *Cerebrum* 6(4)**:** 91, 2004
- Muller, U et al ‘Effects of modafinil on working memory processes in humans’ *Psychopharmacology* 177(1-2): 161, 2004
- Musser CJ et al. Stimulant use and the potential for abuse in Wisconsin as reported by school administrators and longitudinally followed children Journal of Developmental and Behavioral Pediatrics 19: 187–192, 1998.

- Nadler, R and Reiner, PB ‘A call for data to inform discussion on cognitive enhancement’ *BioSocieties* 5(4): 481, 2010
- Nienaber, A ‘The protection of participants in clinical research in Africa: does domestic human rights law have a role to play?’ *African Human Rights Law Journal* 8(1): 138, 2008
- Nienaber A ‘Informed consent to participation in preventive HIV vaccine efficacy trials in the light of section 12(2)(c) of the South African Constitution’ *Journal for Juridical Science* 33(1): 69-101, 2008
- Nienaber, A ‘Consent to research by mentally ill children and adolescents: the implications of chapter 9 of the National Health Act’ *South African Journal of Psychiatry* 19(1): 19-23, 2013
- Norman, C Berger, M ‘Neuroenhancement: status quo and perspectives’ *European Archives of Psychiatry and Clinical Neuroscience* 258: 110, 2008
- Nutt, D et al ‘Development of a rational scale to assess the harm of drugs of potential misuse’ *Lancet* 369(9566): 1047, 2007
- O'Reilly, J and Dalal, A ‘Off-label or out of bounds? prescriber and marketer liability for unapproved uses of FDA-approved drugs’ *Annals of Health Law* 12(2): 295, 2003
- Outram, SM ‘The use of methylphenidate among students: the future of enhancement?’ *Journal of Medical Ethics* 36: 198, 2010
- Outram, SM and Racine, E ‘Developing public health approaches to cognitive enhancement: an analysis of current reports’ *Public Health Ethics* 4(1): 93, 2011
- Parens, E ‘Authenticity and ambivalence: toward understanding the enhancement debate’ *Hastings Center Report* 35(3): 34, 2005
- Partridge, BJ et al ‘Smart drugs “As common as coffee”: media hype about neuroenhancement’ *PLOS One* 6(11): e28416, 2011
- Pastor, PN and Reuben, CA ‘Diagnosed attention deficit hyperactivity disorder and learning disability: United States, 2004-2006’ *Vital Health Statistics* 10(237): 1, 2008
- Perreira, LK and Greenfield, M ‘When parents do not want their daughters on birth control pills: tips for navigating a difficult clinical situation’ *Journal of Peadiatric and Adolescent Gynaecology* 25: 79, 2012

- Piker, A ‘Balancing liberation and protection: a moderate approach to adolescent health care decision-making’ *Bioethics* 25(4): 202, 2011
- Pliszka, SR ‘The use of psychostimulants in the pediatric patient’ *Pediatric Clinics of North* America 45(5): 1085, 1998
- Quednow, BB ‘Ethics of neuroenhancement: a phantom debate’ *BioSocieties* 5(1): 153, 2010
- Racine, E ‘Expectations regarding cognitive enhancement create substantial challenges’ *Journal of Medical Ethics* 35(8): 469, 2009
- Racine E, et al. ‘The value and pitfalls of speculation about science and technology in bioethics: the case of cognitive enhancement’ *Medical Health Care Philosophy* 17(3): 325, 2014
- Ragan, CI et al ‘What should we do about student use of cognitive enhancers? an analysis of current evidence’ *Neuropharmacology* 64: 588, 2012
- Rawls, J ‘Two concepts of rules’ *Philosophical Review* 64(1): 3, 1955
- Reiner, PB ‘Distinguishing between restoration and enhancement in neuropharmacology’ Virtual Mentor 12(11): 885, 2010
- Repantis, D et al ‘Modafinil and methylphenidate for neuroenhancement in healthy individuals: a systematic review’ *Pharmacological Research* 62: 187, 2010
- Repantis, D et al ‘Antidepressants for neuroenhancement in healthy individuals: a systematic review’ *Poiesis & Praxis* 6(3): 139, 2008
- Retief, M and Verster, C ‘Prevalence and correlates of non-medical stimulants and related drug use in a sample of South African undergraduate medical students’ *South African Journal of Psychiatry* 22(1): a795, 2016
- Roache, R ‘Enhancement and cheating’ *Expositions* 2(2): 153, 2008
- Robert, JS ‘Human dispossession and human enhancement’ *American Journal of Bioethics* 5(3): 27, 2005
- Rubinstein, A ‘A sceptic’s comment on the study of economics’ *The Economic Journal* 116: 510, 2006
- Ruxton,CHS ‘The suitability of caffeinated drinks for children: a systematic review of randomised controlled trials, observational studies and expert panel guidelines’ *Journal of Human Nutrition and Dietetics* 27(4): 342-57, 2014

- Saad T. ‘The history of autonomy in medicine from antiquity to principlism’ Medical Healthcare and Philosophy 21(1): 125-137, 2018
- Sahakian, B and Morein-Zamir, S ‘Professor’s little helper’ *Nature* 450: 1157, 2007
- Sahakian, B and Morein-Zamir, S ‘Neuroethical issues in cognitive enhancement’ *Journal of Psychopharmacology* 25(2):197, 2011
- Sandberg, A and Bostrom, N ‘Converging cognitive enhancements’ *Annals of the New York Academy of Science* 1093: 201, 2006
- Santoni de Sio, F et al ‘How cognitive enhancement can change our duties’ *Frontiers in Systems Neuroscience* 8: 131, 2014
- Santoni de Sio, F et al ‘Who should enhance? conceptual and normative dimensions of cognitive enhancement’ *Humana Mente: Journal of Philosophical Studies* 26: 179, 2014
- Sattler, S et al ‘The rationale for consuming cognitive enhancement drugs in university students and teachers’ *PLOS one* 8(7): e68821, 2013
- Savulescu, J ‘Justice, fairness and enhancement’ *Annals of the New York Academy of Sciences* 1093: 321, 2006
- Savulescu, J ‘Rational desires and the limitation of life-sustaining treatment’ *Bioethics* 8(3): 191, 1994
- Savulescu, J et al ‘Why we should allow performance enhancing drugs in sport’ *British Journal of Sports Medicine* 38(6): 666, 2004
- Scheffler, R et al ‘The global market for ADHD medications’ *Health Affairs (Millwood)* 26: 450, 2007
- Scheffler, R et al ‘Positive association between attention-deficit/hyperactivity disorder medication use and academic achievement during elementary school’ *Pediatrics* 123: 1273, 2009
- Schelle, KJ et al ‘Attitudes towards pharmacological cognitive enhancement – a review’ *Frontiers Systems Neuroscience* 8: 53, 2014
- Schermer, M ‘On the argument that enhancement is “cheating”’ *Journal of Medical Ethics* 34(2): 85, 2008
- Schermer, M et al ‘The future of psychopharmacological enhancement: expectations and policies’ *Neuroethics* 2: 75, 2009

- Scheske, C and Schnall S ‘The ethics of “smart drugs”: moral judgements about healthy people’s use of cognitive-enhancing drugs’ *Basic Applied Social Psychology* 34(6): 508, 2012
- Sententia, W ‘Neuroethical considerations: cognitive liberty and converging technologies for improving human cognition’ *Annals of the New York Academy of Science* 1013: 221, 2004
- Schaefer, GO et al ‘Autonomy and enhancement’ *Neuroethics* 7(2): 123, 2014
- Singh I ‘Beyond Polemics: science and ethics in ADHD’ Neuroscience 9: 960, 2008.
- Singh, I ‘Will the “real boy” please behave: dosing dilemmas for parents of boys with ADHD’ *American Journal of Bioethics* 5(3): 34, 2005
- Singh, I ‘Clinical implications of ethical concepts: moral self-understandings in children taking methylphenidate for ADHD’ *Clinical Child Psychology and Psychiatry* 12(2): 167, 2007
- Singh I, Kelleher KJ. ‘Neuroenhancement in young people: proposal for research, policy, and clinical management’ *AJOB Neuroscience* 1(1): 3, 2010
- Singh, I et al ‘Globalization and cognitive enhancement: emerging social and ethical challenges for ADHD clinicians’ *Current Psychiatry Reports* 15(9): 385, 2013
- Smith, ME and Farah, MJ ‘Are prescription stimulants “smart pills”? the epidemiology and cognitive neuroscience of prescription stimulant use by normal healthy individuals’ *Psychology Bulletin* 137(5): 714, 2011
- Spencer, T et al ‘Growth deficits in children with attention deficit hyperactivity disorder’ *Pediatrics* 102(2): 501, 1998
- Stein, DJ ‘Philosophy of psychopharmacology’ *Perspectives in Biological Medicine* 41(2): 200, 1998
- Stein, DJ ‘Psychopharmacological enhancement: a conceptual framework’ *Philosophy and Ethics and Humanities Medicine* 7: 5, 2012
- Steyn, F ‘Methylphenidate use and poly-substance use among undergraduate students attending a South African University’ *South African Journal of Psychiatry* 22(1): a760, 2016
- Strauss, SA ‘“Off-label” use of medicine: some legal and ethical implications *SA Practice Management* 19(1): 12, 1998

- Strode, A et al ‘Failing the vulnerable: three new consent norms which will undermine health research with children’ *South African Journal of HIV Medicine* 15(2): 46, 2014
- Strode A, and Slack, C ‘Child research in South Africa: how do the new regulations help?’ *South African Medical Journal* 105(11): 899, 2015
- Strode A ‘The parameters of the current legal framework for health research: forms of health research which are regulations and obligations imposed on researchers’ (2013) 6(2) *SAJBL* 69-71
- Strode A ‘A critical review of the regulation of research involving children in South Africa: from self-regulation to hyper-regulation’ (2015) 2 *TSAR* 334-46
- Strode, A et al (2018) ‘Research ethics committees in a tight spot: approving consent strategies for child research that are *prima facie* illegal but are ethical in terms of national guidelines’ *South African Medical Journal* 108: 10
- Synofzik, M ‘Ethically justified, clinically applicable criteria for physician decision-making in psychopharmacological enhancement’ *Neuroethics* 2(2): 89, 2009
- Talbot, M ‘Brain gain: the underworld of “neuroenhancing” drugs’ *The New Yorker* April 17, 2009: 32-43.
- Tannsjo, T ‘Ought we to enhance our cognitive capacities?’ *Bioethics* 23: 421, 2009
- Trachtman, H ‘A man is a man is a man’ *American Journal of Bioethics* 5(3): 31, 2005
- Turner, DC et al ‘Cognitive enhancing effects of modafinil in healthy volunteers’ *Psychopharmacology (Berlin)* 165(3): 260, 2003
- Turner, DC et al ‘Modafinil improves cognition and response inhibition in adult attention-deficit/hyperactivity disorder’ *Biological Psychiatry* 55(10): 1031, 2004a
- Turner, DC et al ‘Modafinil improves cognition and attentional set shifting in patients with chronic schizophrenia’ *Neuropsychopharmacology* 29(7): 1363, 2004b
- Turner, DC et al ‘Neurocognitive effects of methylphenidate in adult attention-deficit/hyperactivity disorder’ *Psychopharmacology (Berl)* 178(2–3): 286, 2005

- Turner, DC and Sahakian, BJ 'Neuroethics of cognitive enhancement' *BioSocieties* 1: 113, 2006
- van Amsterdam J et al 'Ranking the harm of alcohol, tobacco and illicit drugs for the individual and the population' *European Addiction Research* 16(4) 202–207, 2010
- van der Schans J et al. Methylphenidate use and school performance among primary school children: a descriptive study BMC Psychiatry (17)116, 2017
- van Wyk, C 'HIV preventative vaccine research on children: is this possible in terms of South African law and research guidelines?' 68 *THRHR* 68:35-50, 2005
- van Zyl, PM et al 'Methylphenidate use among students living in junior on-campus residences of the University of the Free State' *South African Journal of Family Practice* 59(4):123-7, 2017
- Verster, CA and Van Niekerk, AA 'Moral perspectives on stimulant use by healthy students' *South African Medical Journal* 102(12): 909, 2012
- Vincenzo Bagnardi, C et al 'Alcohol consumption and the risk of cancer: a meta-analysis' *Alcohol Research and Health* 25(4): 263-270, (2001)
- Vitiello B 'Pediatric Psychopharmacology and the Interaction Between Drugs and the Developing Brain' The Canadian Journal of Psychiatry 43(6): 584, 1998
- Vogel, W 'An update on attention deficit hyperactivity disorder (ADHD)' *South African Medical Journal* 104(1): 72, 2014
- Volkow, ND and Swanson, JM 'The action of enhancers can lead to addiction' *Nature* 451: 520, 2008
- Volkow, N et al 'Effects of modafinil on dopamine and dopamine transporters in the male human brain: clinical implications' *Journal of the American Medical Association* 301: 1148, 2009
- Vrecko, S 'Just how cognitive is cognitive enhancement? on the significance of emotions in university students experiences with study drugs' *AJOB Neuroscience* 4(1): 4, 2013
- Warburton, DM 'Nicotine as a cognitive enhancer' *Progress in Neuro-Psychopharmacology & Biological Psychiatry* 16: 181, 1991
- Webb, JR et al 'Contemplating cognitive enhancement in medical students and residents' *Perspectives in Biological Medicine* 53: 200, 2010

- Weiss, B and Laties, VG ‘Enhancement of human performance by caffeine and the amphetamines’ *Pharmacological Reviews* 14: 1, 1962
- Weithorn, LA and Campbell, SB ‘The competency of children and adolescents to make informed treatment decisions’ 53(6): 1589, 1982
- Wesensten, NJ et al ‘Maintaining alertness and performance during sleep deprivation: modafinil versus caffeine’ *Psychopharmacology* 159: 238, 2002
- White, HA and Shah, P ‘Creative style and achievement in adults with attention-deficit hyperactivity disorder’ *Personality and Individual Differences* 50: 673, 2011
- Whitehouse, PJ et al ‘Enhancing cognition in the intellectually intact’ *Hastings Centre Report* 27(3): 14, 1997
- Wilens, T et al ‘Misuse and diversion of stimulants prescribed for ADHD: a systematic review of the literature’ *Journal of the American Academy of Child & Adolescent Psychiatry* 47: 21, 2008
- Wood, S et al ‘Psychostimulants and cognition: a continuum of behavioral and cognitive activation’ *Pharmacological Reviews* 66: 193, 2014
- Zito, JM et al ‘Trends in the prescribing of psychotropic medications to preschoolers’ *Journal of the American Medical Association* 283(8): 1025, 2000

Books

- Ackerman, L (2014) *Human dignity: lodestar for equality in South Africa* Cape Town: Juta
- Agar, N (2014b) *Truly Human Enhancement: A Philosophical Defense of Limits* Cambridge: MIT Press
- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM V. 5th ed
- Beauchamp, TL and Childress, JF (2001) *Principles of Biomedical Ethics* 5 ed Oxford: Oxford University Press
- Beauchamp, TL and Childress, JF (2009) *Principles of Biomedical Ethics* 6 ed Oxford: Oxford University Press
- Beauchamp, TL and Childress, JF (2013) *Principles of Biomedical Ethics* 7 ed Oxford: Oxford University Press

- Blank, RH (2013) *Intervention in the Brain: Politics, Policy, and Ethics* Cambridge: MIT Press
- Brunton, L et al (2011) *Goodman and Gilman's The Pharmacological Basis of Therapeutics* 12 ed New York: McGraw-Hill
- Boezaart T (ed) (2018) *Child Law in South Africa* 2 ed Pretoria: Juta
- Buchanan, A (2011) *Better than Human: The Promise and Perils of Enhancing Ourselves* New York: Oxford University Press
- Brockman J (ed) (2013) *This explains everything* New York: Harper Perennial
- Carstens P and Pearmain D (2007) *Foundational principles of South African medical law* Durban: Lexis-Nexis
- Chadwick, R 'Therapy, Enhancement and Improvement' in Gordijn, B and Chadwich, R (eds) (2008) *Medical Enhancement and Posthumanity* Dordrecht: Springer Netherlands
- Collingridge, D (1980) *The Social Control of Technology* New York: St Martin's Press
- Conrad, P (1976) *Identifying Hyperactive Children: The Medicalization of Deviant Behaviour* Lexington: DC Health
- Conrad, P (2007) *The Medicalization of Society*: Johns Hopkins: Johns Hopkins University Press
- Crowther, J (ed) (2005) *Oxford Advanced Learner's Dictionary* New York: Oxford University Press
- Currie I and De Waal J (2014) *The Bill of Rights Handbook* 6 ed Claremont: Juta
- Davel, CJ and Skelton, AM (June 2018) *Commentary on the Children's Act*
- DeGrazia, D (2005) *Human identity and Bioethics* New York: Cambridge University Press
- Dhai, A and McQuoid-Mason, D (2011) *Bioethics, Human Rights and Health Law* Cape Town: Juta
- Dressler, M and Repantis, D (2015) 'Cognitive Enhancement in Humans' in Knafo, S and Venero, C (eds) *Cognitive Enhancement* Amsterdam: Elsevier
- Elliott, C (2003) *Better than Well: American Medicine Meets the American Dream* New York: WW Norton

- Foddy, B and Savulescu, J (2006) 'Ethics of performance enhancement in sport: drugs and gene doping' in Ashcroft, RE et al *Principles of Health Care ethics* Chichester: Wiley
- Foster C *Human Dignity in Bioethics and Law* (2011) Portland: Hart
- Fukuyama, F (2002) *Our posthuman future: consequences of the biotechnology revolution* New York: Farrar, Strauss and Giroux
- Gazzaniga, MS (2005) *The Ethical Brain* New York: Dana Press
- Giesen, D (1988) *International Medical Malpractice Law*
- Glannon, W (2011) *Brain, Body and Mind: Neuroethics with a Human Face* New York: Oxford University Press
- Gross, MB and Wilson, WC (1974) *Minimal cerebral dysfunction* New York: Brunner
- Harris, J (2007) *Enhancing evolution* Princeton: Princeton University Press
- Herrnstein, RJ and Murray, CA (1994) *The bell curve: Intelligence and class structure in American life* Salt Lake: Free Press
- Hornby AS (ed) (1995) *Oxford Advanced Learner's Dictionary* 5 ed New York: Oxford University Press
- Hornby AS (ed) (1998) *Oxford advanced learner's dictionary special price edition* New York: Oxford University Press
- J Hughes Citizen (2004) *Cyborg: Why democratic societies must respond to the redesigned human of future* Boulder: Westview Press.
- Illes, J and Sahakian, B (eds) (2011) *Oxford Handbook of Neuroethics*. Oxford: Oxford University Press
- Jotterand, F and Dubljević, V (eds) (2016) *Cognitive Enhancement: Ethical and Policy Implications in International Perspectives*. New York: Oxford University Press
- Juengst, E 'What does enhancement mean?' in Parens, E (ed) (1998) *Enhancing human traits: Ethical and social implications* Washington, DC: Georgetown University Press
- Kass, LR (1985) *Toward a More Natural Science* New York: The Free Press
- Kass, LR (2002) *Life, Liberty, and the Defense of Dignity: The Challenge for Bioethics* San Francisco: Encounter Books

- Khushf, G 'The second stage enhancements' in Jotterand, F (2008) *Emerging conceptual, ethical and policy issues in bionanotechnology* Dordrecht: Springer
- Kirk, S and Kutchins, H (1992) *The Selling of DSM: The Rhetoric of Science in Psychiatry* New York: Aldine de Gruyter
- Kramer, PD (1993) *Listening to Prozac* New York: Penguin Books
- Kutchins H and Kirk SA (1997) *Making Us Crazy: DSM: The Psychiatric Bible and the Creation of Mental Disorders* New York: New York University Press
- Levy, N (2011) *Neuroethics: Challenges for the 21st Century* Cambridge: Cambridge University Press
- Marcus, SJ (2002) *Neuroethics: Mapping the Field* New York: Dana
- Maslen, H et al 'With cognitive enhancement comes great responsibility?' in Koops, BJ et al (eds) (2015) *Responsible Innovation 2 – Concepts, Approaches, and Applications* Switzerland: Springer
- McIntosh, C (ed) (2013) *Cambridge Advanced Learner's Dictionary* 4 ed South Africa: Cambridge University Press
- Meulen, R et al (2017) *Rethinking Cognitive Enhancement* Oxford: Oxford University Press
- Miah, A 'Ethical issues raised by human enhancement' in Gonzalez, F (ed) (2011) *Values and ethics for the 21st century* Spain: BBVA
- Moodley, K (ed) (2010) *Medical Ethics, Law and Human Rights: A South African Perspective* Pretoria: Van Schaik Publishers
- Nagel S (ed) *Shaping Children* (2019) Switzerland: Springer.
- Parens, E (ed) (1998) *Enhancing human traits: Ethical and social implications* Washington: Georgetown University Press
- President's Council on Bioethics (2003) *Beyond therapy: Biotechnology and the pursuit of happiness* New York: Regan Books
- Racine, E (2010) *Pragmatic Neuroethics: Improving Treatment and Understanding of the Mind-Brain* Cambridge: MIT Press
- Sadock BJ, et al (2015) *Kaplan and Sadock's Synopsis of Psychiatry*. 11 ed. Philadelphia: Wolters Kluwer
- Sandel, MJ (2007) *The case against perfection: Ethics in the age of genetic engineering* Cambridge: Harvard University Press

- Savulescu JR et al (ed) (2011) *Enhancing human capacities* Oxford: Wiley Blackwell
- Stein, DJ (2008) *Philosophy of Psychopharmacology* Cambridge: Cambridge University Press
- Steinbeck B (ed) (2007) *Oxford Handbook of Bioethics* New York: Oxford Uniersity Press
- Taylor, C (1991) *The Ethics of Authenticity* Cambridge: Harvard University Press
- UNICEF (2009) *Children's Act Explained – Booklet 1: Children and parents – rights and responsibilities* Pretoria: Government Printer
- Vincent, N 'The challenges posed to private law by emerging cognitive enhancement technologies' in Vincent, NA et al (eds) (2011) *Law of the Future and the Future of Law* Oslo: Torkel Opsahl Academic EPublisher
- Wolbring, G 'The unenhanced underclass' in Miller, P and Wilsdon, J (eds) (2006) *Better humans? The politics of human enhancement and life extension* London: Demos

Acts

- The Constitution of the Republic of South Africa, 1996
- Medicines and Related Substances Act 101 of 1965
- Health Professions Act 56 of 1974
- Child Care Act 74 of 1983
- Drug and Drug Trafficking Act No 140 of 1992
- Tobacco Products Control Act 83 of 1993
- South African Schools Act 84 of 1996
- National Liquor Act 59 of 2003
- Customs and Excise Tax Act 91 of 1964
- National Health Act 61 of 2003
- Children's Act 38 of 2005
- Abuse of Dependence-Inducing Substances and Rehabilitation Centres Act 41 of 1971
- Medical Innovations Bill, (GG37349) 2014

- South African Government. Regulations Relating to Research with Human Participants. Government Gazette No. R 719 of 19 September 2014.

Case Law

- *Bernstein v Bester* 1996 (2) SA 751 (CC), 1996 (4) BCLR 449 (CC)
- *Castell v De Greef* 1994 (4) SA 408 (C)
- *Prince v Minister of Justice and Constitutional Development; Rubin v National Director of Public Prosecutions; Acton v National Director of Public Prosecutions 2017 (4) SA 299 (WCC).*
- *Minister of Justice and Constitutional Development v Prince (Clarke and Others Intervening); National Director of Public Prosecutions v Rubin; National Director of Public Prosecutions v Acton 2018 (6) SA 393 (CC)*
- *British American Tobacco South Africa (Pty) Ltd v Minister of Health* [2012] All SA 593 (SCA).
- *S v Makwanyane* 1995 (3) SA 391 (CC)
- *Treatment Action Campaign v Minister of Health* 2002 (4) BCLR 356 (T).

International Conventions

- Constitution of the World Health Association, 1948
- United Nations Convention of the Rights of the Child
- United Nations Single Convention on Narcotic Drugs,1961 (amended in 1972)
- United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988
- United Nations International Covenant on Civil and Political Rights, 1966
- World Medical Association. WMA Declaration of Helsinki – Ethical Principle for Medical Research Involving Human Subjects. Available at: https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/ [Accessed on 4 October 2018]
- The Nuremberg Code, 1947

- African Charter of the Rights and Welfare of the Child OAU Doc. CAB/LEG/24.9/49 (1990)

Reports

- Joint Report of the Academy of Medical Sciences, the British Academy, the Royal Academy of Engineering and the Royal Society (2012) 'Human Enhancement and the Future of Work'
- Commission de l'éthique de la science et de la technologie (2009) 'Position statement on psychotropic drugs and expanded Uses: an ethical perspective'
- International Narcotics Board (2005) 'Report of the International Narcotics Control Board for 2005' New York
- Statistics South Africa (2016) 'Mortality and Causes of Death in South Africa, 2016 Findings from death notification'
- Statistics South Africa (2018) 'General Household Survey'
- Hastings Center (1996) 'The goals of medicine: Setting new priorities'
- World Health Organization (2010) 'Guidance on the WHO Review of Psychoactive Substances for International Control' Geneva
- United Nations (1973) 'Commentary on the Single Convention on Narcotic Drugs' New York
- English, Veronica. (2007) 'Boosting your brainpower: ethical aspects of cognitive enhancements. A discussion paper from the British Medical Association.' London: British Medical Association.
- Sarewitz D, Karas TH. (2007) 'Policy Implications of Technologies for Cognitive Enhancement.' Alburquerque, NM: Sandia National Laboratories
- The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1979) 'The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research'
- World Health Organisation 'The health and social effects of nonmedical cannabis use' (2016)
- Centers for Disease Control and Prevention 'Increasing prevalence of parent-reported attention-deficit/hyperactivity disorder among children-United States, 2003 and 2007' 59(44) Morbidity Mortality Weekly Report 1439-43 (2010)

- Centre for Disease Control and Prevention 'Project to learn about ADHD in youth (PLAY) study findings' (2012).

Guidelines

- HPCSA. Guidelines for Good Practice in the Healthcare Professions. National Patients' Rights Charter. Booklet 3. 2008
- HPCSA. Ethical and Professional Rules of the Health Professions Council of South Africa, Booklet 2, September 2016.
- Hodgkin R and Newell P Implementation Handbook for the Convention of the Rights of the Child Unicef (2007)
- Centers for Disease Control and Prevention (CDC). Increasing prevalence of parent-reported attention-deficit/hyperactivity disorder among children-United States, 2003 and 2007. Morbidity Mortality Weekly Report (MMWR) 59: 1439-1443 (2010)
- Department of Health. Ethics in Health Research: Principles, Processes and Structures. 2nd ed (2015)
- Schuijff, Mirjam. 2009. STOA: Human Enhancement Study. The Hague: Rathenau Institute.
- CDC. Project to learn about ADHD in Youth (PLAY) Study Findings. 2012
- CDC. ADHD Data and Statistics. 2013
- CDC. Health effects of cigarette smoking. Centre for disease control and prevention. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm
- Medicines Control Council. Scheduling of medicines: guidelines. 2014

Dissertations and Theses

- van Oosten, FW (1989) *The doctrine of informed consent in medical law* (University of South Africa, unpublished LLD thesis)

Movies

- Walt Disney Pictures 'The Incredibles' (2004)