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Instrumentalising therapeutic and enhancement drugs as pharmacological technologies with politicogenic drug effects

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ABSTRACT

This paper continues to develop 'drugs as instruments' framework by reviewing Science and Technology Studies (STS), critical drug studies and anthropology of pharmaceuticals literature that frames drugs as pharmacological technologies. By discussing especially human enhancement drugs (HEDs) this approach is situated in the new materialist turn in critical drug studies. All drugs, medical and nonmedical, are framed as pharmacological technologies and discussed as nonhuman actors. When discussing drugs as technologies the paper will focus generally on their 'social effects' which include extra-pharmacological variables. These extra-pharmacological variables include what the author refers to as politicogenic drug effects, meaning effects that derive from contemporary drug policing.

1. Introduction

This paper reviews recent literature that conceptualises all drugs, medical and non-medical, licit and illicit, as *pharmacological technologies*. So-called human enhancement drugs (HEDs, Van de Ven et al., 2019; Hope et al., 2021) are used as an example to discuss this approach, especially 'cognitive enhancement drugs' (e.g. Coveney & Bjønness, 2019; Ter Meulen et al., 2017). 'Drugs as instruments' framework (Müller & Schumann, 2011) is used as a starting point, but discussed from a more sociological rather than neuropharmacological and behavioural standpoint, as Müller and Schumann did over a decade ago (2011; see also Askew & Williams, 2021). For instance, while their framework for non-addictive psychoactive drug use does consider *microenviroments* and other important drug use 'settings' and their effects on individual drug use, Müller and Schumann (2011) focus more thoroughly on pharmacological variables compared to for instance drug policy environments in different country contexts (Hupli, 2020).

As discussed in detail by Müller and Schumann (2011), several researchers have looked at the lived experiences of drug use in people's efforts to improve parts of themselves. Various qualitative studies have pointed to different 'functional' significance various pharmaceutical and other drugs have for people who use them (Bundy & Quintero, 2017; Duff, 2015; Hupli et al., 2016; 2019; Moyle et al., 2020; Petersen et al., 2015a,b; Vrecko, 2013, 2015). Several critical drug studies have arrived at similar conclusions about this type of 'instrumental use of drugs' in various real-life situations (e.g. Askew & Williams, 2021; Hardon, 2021; Lende et al., 2007; Silva et al., 2013).

These empirical findings call for a theoretical framework to situate the variety of drugs used for various effects (Müller & Schumann, 2011) that often go beyond the illicit/licit or medical/non-medical dichotomy (Askew & Williams, 2021). As Dennis and Farrugia (2017, p. 89) state '[W]orking with the dynamic and potentially unpredictable directions drugged assemblages and their pleasures can take requires flexible research and policy approaches that are not dogmatically aligned to one particular reality'.

This is important also because 'as social scientists we have to try to find the concepts which make a difference, to listen to what people are saying' (Latour in Barron, 2003). In addition, the realities Alcohol and Other Drug (AOD) researchers often encounter requires that we care about them (Duff, 2017), that there is 'an ethics of care' (Duff, 2015; see also Harris & Luongo, 2021). People who use drugs are seen here as technology consumers who function as 'theoretical telescopes', as lenses into our contemporary world; and the picture those lenses paint is not pretty in relation to how we treat each other, and especially those we categorise as 'drug users' (e.g. Alexander, 2010; GCDP, 2017; Harris & Luongo, 2021; IDPC, 2018) who use different 'technologies of the self' (Foucault, 1997) like psychoactive drugs (Duff, 2015; Pienaar et al., 2020) 'as tools for self-improvement' (Askew & Williams, 2021).

After reviewing some of the literature that frame drugs as pharmacological technologies, or as nonhuman actors (Barron, 2003; Latour, 1994), in the end the author will discuss what is referred to here as *politicogenic drug effects*, meaning effects that derive from current drug policing (Hupli, 2021) which are often, but not always, neglected

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when discussing human enhancement and other drugs (e.g. Chatwin et al., 2017; Hope et al., 2021). Thus, the framework here aims to build on the previous work on 'drugs as instruments' by Müller and Schumann (2011) and takes the bioethical discussion around a drug use practice called pharmacological neuroenhancement (Maier & Schaub, 2015) as a way to make a further case for conceptualising all drugs, medical and nonmedical, as pharmacological technologies.

This also relates to the processes of pharmaceuticalisation, which 'is centred on the chemistry-based technology embodied in the pill' (Williams et al., 2011, p. 711). However, this paper focuses less on the 'upstream (macro) level processes concerning the development, testing and regulation of pharmaceuticals' and more on the 'downstream (micro) processes pertaining to the meaning and use of pharmaceuticals (and other drugs, added by author) in medical practice and everyday life' (Williams et al., 2011, pp. 711–712).

2. Human enhancement technologies and the distinction between therapy and enhancement

The similarities between so-called human enhancement technologies (HETs), which include for instance transcranial magnetic stimulation (TMS) and deep brain stimulation (DBS) (e.g. Ter Meulen et al., 2017), is that they are considered not only novel treatments for human ailments but as potential technologies for enhancing human capabilities (e.g. Wolpe, 2002). For sake of simplicity, the author's approach to HETs focuses specifically on pharmacological neurotechnologies, and thus far the discussion and empirical research on the use of cognitive enhancement drugs (CEDs) for instance has focused mainly on prescription stimulants, like Provigil™ (modafinil), Adderall™ (dextroamphetamine) and immediate-release methylphenidate, which is often known by its original brand name, Ritalin™ (Coveney et al., 2011; Coveney & Bjønness, 2019; Maier & Schaub, 2015). The latter two are nowadays standard stimulant drug treatments mainly for Attention Deficit/Hyperactivity Disorder (ADHD) (e.g. Moncrieff 2009; Singh et al., 2013). However, the framing provided could be explored for other pharmacological technologies that have barely been discussed or researched in sociology of technology, STS or bioethics literature especially in relation to human enhancement drugs. These include for instance cannabis and psychedelics (Askew & Williams, 2021; Franke et al., 2016; Liokaftos, 2021; Moyle et al., 2020), around which boundaries between 'bad drugs' and 'good medicines' have been breaking down for some time (e.g. Pieters & Snelders, 2009).

The discussion around human enhancement technologies has often been framed 'as a debate about where *treatment* ends and *enhancement* begins' (Maslen et al., 2014, p. 6, italics in the original; Hofmann, 2017). In other words, drugs and other technologies are seen either as a treatment for a pathological neurocognitive impairment, like deficits in attention, or even able to enhance cognition beyond 'normal species functioning' (Daniels, 2000; Bostrom & Sandberg, 2009; Schermer, 2007). However, as Bostrom and Sandberg (2009, p. 312) state, this distinction between therapy and enhancement 'is often difficult to discern' and 'lacks practical significance'. This distinction is even partly result of research itself into the phenomena of cognitive enhancement drugs (see Bullard, 2018).

As with other drug use, context and motivation plays a crucial role (Hope et al., 2021; Shook & Giordano, 2016); for example, some students with self-reported ADHD also use drugs for 'enhancement', while others are convinced they have ADHD, even without a formal diagnosis, and use stimulants 'therapeutically' (Hupli et al., 2019). Also, as stated by an EU-funded enhancement technology assessment: 'Because of the fine lines involved in the diagnosis of ADHD, which require normative judgments that are highly sensitive for diverging opinions, it is often hard to judge whether Ritalin™ is used as a therapeutic or an enhancing agent' (STOA, 2009, p. 85)

In drug research, similar blurred boundaries have been shown in relation to using drugs for sexual enhancement (Moyle et al., 2020; Pienaar et al., 2020) or for instance between medical and recreational cannabis (see Lancaster et al., 2017), as many users report to grow and use cannabis for medicinal reasons, including for ADHD (Hakkarainen et al., 2015; Hupli, 2019). While this blurring is more between 'recreational' and 'therapeutic' use, cannabis is also used as a 'sexual' (Moyle et al., 2020; Pienaar et al., 2020) and 'cognitive enhancer' (Franke et al., 2016; Hupli et al., 2016, 2019). While stimulants are more discussed and researched form of cognitive enhancement (e.g. Coveney & Bjønness, 2019; Maier & Schaub, 2015), nonetheless, it is possible that what has been previously categorised in empirical research as recreational, or illegalised drug (ab)use, has in practice already been for 'enhancing suboptimal performance' (Schermer 2007, p. 33) and/or self-medication against study and work-related stress (Maier et al., 2015). This further complicates simple categorisations both in research (Askew & Williams, 2021; Hope et al., 2021; Moyle et al., 2020; Müller & Schumann, 2011) and drug policy with practical implications to harm reduction and public health efforts (Duff, 2015; Jotterand & Dubljevic, 2016).

Bioethicist Paul Wolpe (2002, pp. 390–391) sees that the distinction between treatment and enhancement requires inquiry on three different areas: (1) medicine and reimbursement (2) public policy and (3) normative behaviour. At the end of this article the focus is on one area of public policy, namely drug policing. While this distinction seems to be complex both in theory and in practice (Hofmann, 2017; Hupli et al., 2019; Schermer, 2007), what is common for both therapeutic and enhancement drug use is the aim for improvement (Askew & Williams, 2021; Chadwick, 2008; Hope et al., 2021). As Nicholas Rose (2009, p. 80) argues 'what is involved here cannot be divided according to the binary logic of treatment versus enhancement; it is a constant work of modulation of the self in relation to desired forms of life'. This 'modulation of the self' sometimes includes instrumentalised use of drugs as 'a set of tools' (in Oldani et al., 2014; also Müller & Schumann, 2011; Williams et al., 2011), or as 'technologies of the self', as Michel Foucault (e.g. 1997) referred to various self-practices and techniques (see Askew & Williams, 2021; Duff, 2015; Pienaar et al., 2020; Rose, 2007).

However, in most parts of the world, this 'modulation of the self' with certain drugs is highly illegalised, showing how the distinction between therapy and enhancement, or medical and nonmedical, has several real-life consequences as discussed in more detail below. The author of this paper argues that one of the reasons 'enhancement' drugs remain to be 'a futuristic potential' (Hupli, 2021) is that the 'war on drug users', 'which is responsible for thousands of deaths a year globally, and the social and political death or exclusion of thousands more' (Zigon, 2015), remains to be a dominant political reality and preventing pharmacological neuroenhancement to take place, at least legally (Hupli, 2021). This is despite the fact that so-called neuroenhancement drug use is something that is discussed in various governmental reports and medical association guidelines (see Outram & Racine, 2011 for a review) and does seem to occur to some extent depending for instance on geography and population (e.g. Daubner et al., 2021; Hope et al., 2021; Maier et al., 2018; Maier & Schaub, 2015).

As stated in the EU-funded SIENNA project report regarding legal frameworks for several enhancement technologies, the area of pharmaceuticals and other drugs 'remains a heavily disputed debate' (Warso, 2019) and the authors of the project refrained from providing legal framework for pharmaceuticals and other drugs for enhancement purposes while providing them for several other enhancement technologies. While the author's aim here is not to resolve these issues, he hopes to nonetheless map out a few theoretical ways forward by also discussing so-called '*politicogenic drug effects*' (Hupli, 2021) of current drug policies.

This conceptualisation can help to ask questions such as; what are the global effects of all drugs and what are the effects of their policing? What if the use of pharmacological technologies for enhancement purposes were not only allowed, but promoted, or even made mandatory in the same ways as certain medical technologies? What would an appropriate and effective social and policy response be, which would reduce potential harms of professionally marketed (enhancement) technologies and enhance the benefits experienced by users and society at large?

While answering some of these questions cannot fit in this article, below a more detailed way of looking at drugs as technologies will be provided. The focus is generally on their 'social effects' and 'modes of action' which include 'extra-pharmacological variables' (Hartogsohn, 2017) like *politicogenic drug effects* (Hupli, 2021). First, to situate this approach in the wider Science & Technology Studies (STS) discussion, and to adopt 'a critical distance' (Morrison, 2015) to the human enhancement drug debate, this article draws from STS literature (see; Coveney et al., 2011; Pickersgill & Hogle, 2015), anthropology of pharmaceuticals (Hardon & Sanabria, 2017) and critical drug studies (e.g. Askew & Williams, 2021; Duff, 2011, 2017).

3. STS approach to drugs as non-human actors

STS and Actor-Network Theory (ANT) approaches have been previously employed in social scientific research around recreational drug use, focusing for instance on alcohol and harm reduction (e.g. Duff, 2011, 2012), recovery (Sultan & Duff, 2021) and the co-production of 'drugged pleasures' (Dennis & Farrugia, 2017; Holt & Treloar, 2008). In relation to enhancement technologies Morrison (2015, p. 10) sees that 'An STS approach must adopt a critical distance from the enhancement debate, taking the concept of enhancement as a topic of investigation rather than a given 'fact' about the technologies and accounts being studied'. Askew and Williams (2021, p. 3) also state in relation to enhancement drugs that 'Adopting a critical drugs studies perspective allows us to question what we mean when we apply the term enhancement to substance use and how it is constructed and constituted in everyday life.' One way of pursuing this is by looking at enhancement technologies, like drugs, as 'nonhuman actors' (Barron, 2003; Latour, 1994).

In a very generalised way, drugs as 'nonhuman actors' (e.g. Barron, 2003; Latour, 1994) means that they are viewed as material objects that are part of co-creating different social networks, practices, effects, meanings, relations and assemblages in different times, contexts and places (e.g. Barry, 2005; Dennis & Farrugia 2017; Duff 2011, 2012). Studies in this field generally point to the interconnected agency of drugs as material things, or as Barry (2005) frames them as 'informed materials' (also Duff, 2017; Greene & Sismondo, 2015; Hardon, 2021).

This approach in AOD research is sometimes referred to as 'new materialist' in which the general idea is to explore 'how materiality is relationally made or takes shape' (Dennis & Farrugia, 2017, p. 87) especially in relation drugs and their myriad effects. According to Pienaar et al. (2020, p. 2), this type of relational approach 'invites us to decentre the analytic focus on the human subject and attend more carefully to the agency of non-human as well as human actors in generating drug effects.'

This emphasis on relational materiality which surrounds different social and cultural dimensions of drugs have also been explored in the field of the anthropology of pharmaceuticals (Hardon & Sanabria, 2017; Van der Geest et al., 1996; Whyte et al., 2002). Whyte et al. (2002, p. 3) 'propose to see them [medicines] as things with social lives; we are more concerned with their social uses and consequences, than with their chemical structure and biological effects.' In a similar way, STS scholars Greene and Sismondo (2015, p. 2) also suggest that a pharmaceutical is 'always a thing, a part of the material world invested with specific forms of value and stamped with highly regulated forms of knowledge.' They also point out that 'bare molecules do not become pharmaceuticals [or other drugs, added by author] without ties to health concerns, scientific knowledge, appropriate regulation, effective marketing, and receptive prescribers and publics' (ibid.; see also Barry, 2005; Fraser et al., 2009; Hardon & Sanabria, 2017).

Thus, conceptualising drugs as technologies, as nonhuman actors, can help to see how they are surrounded by complex social networks of effects, meanings and knowledge(s) (Hardon, 2021). It is important to emphasise that the idea of drugs as technologies 'signify' here all kinds of molecules used intentionally by individuals to modulate their life and brains through changing their so-called 'neurochemical self'[1] (Rose, 2003, 2007), and their life situations in general, both

legally and illegally, medically and nonmedically, for therapy and for 'enhancement' (e.g. Askew & Williams, 2021; Hardon, 2021; Hupli et al., 2019; Oldani et al., 2014).

It is argued that by framing both pharmaceuticals and other drugs 'neutrally' and mutually as pharmacological technologies helps to approach different kinds of drug effects and use(rs) without certain pre-existing dichotomies (i.e. good vs. bad/legal vs. illegal/therapeutic vs. enhancing) and/ or negative and biased attitudes and assumptions towards certain groups of drugs, or towards their users (Askew & Williams, 2021; Dennis & Farrugia, 2017; Duff, 2015). Of course, technologies and other nonhuman actors in general are not value-free; for instance, technologies surrounding atomic energy can be used to supply electrical power, or destroy cities, both of which are attached with serious moral questions and political responses.

However, a limited conception of some drugs as mainly pathological has partly blurred the socially constructed nature of 'drugs' and 'drug users' to almost beyond recognition (Harris & Luongo, 2021), which also obscures their relative efficacy and safety (Moncrieff, 2009; Van Amsterdam et al., 2015). By framing both medical and non-medical drugs as technologies, it is possible to partly bridge the gap between pharmaceuticals and other drugs, and focus on their actual effects (Müller & Schumann, 2011), instead of mere imaginary and promoted ones (Healy, 2004; Medawar & Hardon, 2004). This is not to say that perceptions about drugs do not contribute to their effects, as discussed more below, but as Moncrieff (2009, p. 17) suggests with her 'drug-centered model of drug action … we can understand effects of drugs that are used therapeutically in essentially the same way as we understand the effects of recreational drugs'.

While nowadays pharmaceuticals have also received increasing social scientific attention (e.g. Fraser et al., 2009; Greene & Sismondo, 2015; Rose, 2003, 2007) it is common to research and especially police these categories of drugs as separate entities. Whichever way pharmacological neurotechnologies are framed, as 'nonhuman actors' they are already part of contemporary life: 'Whether interpreted as medicinal, pathological, and/or addictive, psychotropics can now be obtained il/legally and have become another everyday 'set of tools' […] for human beings to modify or enhance their mood, emotional states, behavior, and social relations' (Oldani et al., 2014, p. 177; also Rose 2003, 2007).

4. Framing drugs as pharmacological technologies

Motivations for any type of drug technology use, be it medicinal, recreational, enhancing, self-medicative, self-reflective, or for pure pleasure are to a large extent empirical questions which often have a variety of answers depending on the context (Dennis & Farrugia, 2017; Duff, 2011). When discussing about the *physical* effects of drugs as technologies, there are several things that should be considered: firstly, what *is* the specific technology, 'chemical compound' and/or molecule in question, what is its pharmacological structure, whether it comes in a 'natural form', like plants and fungi, or whether it is synthetically produced in crystallised or liquid form;

secondly, after defining the structure of the technology, the way the technology is used, more specifically how it enters your human physiology and from which part, which is often referred to as the '*route of administration*' (for instance, oral, intravenous, nasal, rectal, topical or via inhalation). Thirdly, there are *pharmacokinetics*, which, to put it briefly, means what does your human physiology do to the technology in question after it enters you; fourthly *pharmacodynamics*, meaning what are the effects of the technology on your human physiology. Finally, but importantly, *dosing*, or the dose administered. All of these 'technical' factors surrounding various physical effects (Müller & Schumann, 2011) and some of the more social ones described below, are at play when our human physiology is interacting with an 'external' molecule in the form of a pharmacological technology.

It is important to note that when it comes to 'psychoactive' technologies, these interactions on a pharmacological level cause mostly temporary effects that last from minutes to days, depending for example on the dose and the 'half-life' of the 'instumentalised drug' in question (Müller & Schumann, 2011). On a social level, these effects can last significantly longer, for instance in the form of social stigma, imprisonment and/or individual habit formation, even dependence, towards the use of a specific technology. Below, these types of social effects will be partly described as 'politicogenic drug effects'.

To turn more to 'extra-pharmacological variables' (Hartogsohn, 2017) in relation to effects and efficacy, according to Whyte et al. (2002, p. 15, italics added) 'efficacy relates to *perceptions* of the powers of medicinal substances'. In other words, the effects of pharmacological technologies are not solely resulting from the pharmacological properties but partly also based on how their efficacy is perceived (Moerman, 2002). This also applies to social perceptions. To give an example, opioids are used both in- and outside of hospitals to mainly treat pain (usually physical, sometimes psychological through self-medication) but social perceptions differ greatly depending on who uses a particular opioid, and where. For instance, take a medical patient using GMP (Good Manufacturing Practices) produced prescription opioid to deal with post-surgery pain. The patient is perceived very differently than a homeless person injecting di-a-morphine ('heroin') on a street corner in order to self-medicate their traumatic life situation (see Rolles et al., 2021; Vitellone, 2003). However, on the level of the human organism's opioid system, the mechanism of drug action in relation to our innate endorphin system is basically identical in both mentioned cases, if factors like drug purity and precise dosing with a hygienic instrument are left out of the equation. But the social effects differ greatly; in the first case the social effects usually include receiving a medical bill, while in the latter, potentially enforced time in prison and loss of civil liberties (Vitellone, 2003; Hupli, 2021).

Thus, efficacy is not only linked to perceptions, but also the immediate social environment where these technologies are used contribute to the global effects (see Hardon, 2021). Especially the acute effects of so-called classical psychedelics seem to be linked to the specific physical and social environment where they are taken: 'The effects of hallucinogens vary

markedly from individual to individual and from session to session, depending on the context, expectations, and environment of the session' (Bogenschutz, 2013, p. 19; see also Langlitz, 2010; Hartogsohn, 2017). In other words, in modern clinical trials with classical psychedelics 'what is really being measured is the combined effect of the drug-psychosocial treatment combination' where the surrounding environment also plays an important role (Bogenschutz, 2013, p. 19; see also Johnson et al., 2008; Langlitz, 2010).

This role of so-called 'set and setting' (e.g. Hartogsohn, 2017), or *microenvironment* (Müller & Schumann, 2011) and context (Shook & Giordano, 2016) would require more attention when discussing human enhancement drugs (Chatwin et al., 2017; Hope et al., 2021; Van de Ven et al., 2019). Whether these types of 'modes of action' regarding instrumental drug effects and the 'setting' (the immediate environment they are used in) can be generalised to all human enhancement drugs and other enhancement technologies would require research. As mentioned, the more general 'human enhancement technology' discussion for instance involves various neurotechnologies, from transcranial magnetic stimulation (TMS) to deep brain stimulation (DBS), with their unique ethical and other challenges (STOA 2009; Warso, 2019). The impact of the immediate psychical environment on the effects of these enhancement technologies have hardly been considered.

Nonetheless, even compared to invasive deep brain stimulation which requires neurosurgery, literally opening up a patient's skull and poking their brain with a surgical knife in order to implant a device that is controlled externally, there is something about 'drugs', and our modern moralistic approach to them (Dennis & Farrugia, 2017; Duff, 2015; Tupper, 2012), that calls for a theoretical framework that goes beyond the bad drug/good medicine, therapy/enhancement dichotomy (Askew & Williams, 2021) and also looks into the effects of contemporary drug policing. These boundaries between therapeutic, enhancement and recreational use of different pharmacological technologies, which, again, are often not as clear cut as they seem (e.g. Askew & Williams, 2021; Hofmann, 2017; Hupli et al., 2019), requires more STS research to evaluate their potential societal and individual impacts. The author argues that these dichotomies are part of 'politicogenic drug effects' (Hupli, 2021).

5. Politicogenic drug effects

(Inter)national drug policy regulations, especially since the 1960s, have categorised the use of certain 'drugs' as objects to be prevented, even 'a serious *evil* for the individual' (UN, 1961, italics added; see also Tupper, 2012). At the same time, other drugs are seen as essential and medicinal (e.g. WHO Essential Medicines list) and several psychoactive plant-derivatives, like tobacco, coffee, sugar and ethyl-alcohol, are considered to be basic consumer products which need to meet certain quality regulations in order to be sold and marketed on a global scale (e.g. Wadley, 2016). All of these have their own pharmacological effects, but as argued, also effects that derive from their policing.

Politicogenic drug effects refer here to (ill) effects caused by political activity in the drug policing field in a similar way that 'iatrogenic' effects refer to (ill) effects caused by medical activity (Illich, 1976). As presented by researchers and civil society organisations, drug policies and their practical enforcement in the last century has in many places caused significantly more harm to users than many of the drugs themselves (Duff, 2015; GCDP, 2017; IDPC, 2018; Rolles et al., 2021). Examples of politicogenic drug effects include loss of civil liberties due to criminalisation, denied access to health and social services, lack of quality control of consumed products leading to unnecessary health risks and overdose as well as militarised law enforcement (e.g. Hupli, 2021; IDPC, 2018).

As mentioned, part of these effects are how societies perceive 'drugs' and their users, which usually means that 'different drugs are lumped together as are the individuals who use them, even though different people use different drugs for diverse reasons and under a wide range of sets and settings and to varying degrees' (Grinspoon, 1994, pp. 176–177; GCDP, 2017). An analogy would be, for instance, to categorise depression, anxiety, and bipolar disorder all under the same umbrella term of 'mental health disorders', and *not* design treatments and services according to the different characteristics of these conditions. And not just that, but the 'mentally ill' would be considered criminals and the 'mental health crisis' would be tackled with increasingly militarised police force.

Another example of a politicogenic drug effect is that many contemporary 'illegalised drug users' often cannot have adequate certainty and knowledge of what they are consuming, which increases the risks associated with that use (e.g. Hardon, 2021; Rolles et al., 2021). At the same time, 'legalised drug users' often find that the professionally marketed effects of, for instance, several prescription drugs are ineffective and/or benefits are overshadowed by sometimes silenced adverse effects (Healy, 2004; Medawar & Hardon, 2004; Moncrieff, 2009). Partly to counter these politicogenic drug effects, some users who augment their brain and body function with various pharmacological technologies have developed their own kind of peer-review system, online and offline, as a form of 'harm reduction from below' (Berning & Hardon, 2016; Hardon, 2021; Hardon & Hymans, 2016; Van Schipstal et al., 2016).

How factors like race, gender, religion, and national policies influence 'politicogenic drug effects' are something that could, and should, be measured (see IDPC, 2018; Rolles et al., 2021). Time is another factor. As mentioned, on a pharmacological level when it comes to 'psychoactive' technologies various factors and their interactions cause mostly temporary effects that last from minutes to days, depending for example on the dose, the 'half-life' and other factors listed above. On a social level these effects can last significantly longer: for example crack cocaine use leads to significantly longer imprisonment than cocaine use which is arguably based on social factors, such as current policies affecting especially certain minority groups (e.g. Alexander, 2010), and therefore more of a politicogenic drug effect than a pharmacological one.

Politicogenic and pharmacogenic effects interact with each other, at least to some extent (e.g. Rolles et al., 2021). The extent and impact of these effects, together and separately, requires empirical and conceptual disentanglement also in relation to human enhancement drugs which is not simple (Hope et al., 2021). From a public health perspective, contemporary drug policies do not seem to reflect the evidence-based view of individual and social harms associated with certain 'drugs' (e.g. Van Amsterdam et al., 2015) that take into account politicogenic drug effects. This is not particularly new evidence, as for decades now, various individuals and groups have called for global and national drug policy reform to change the focus of drug control from criminal policy towards more health-oriented approaches (e.g. Csete et al., 2016; GCDP, 2017; IDPC, 2018). So far, these efforts have not been able to shift the current prohibition-based focus, even in cases where there is evidence that less punitive approaches could prevent drug-related deaths (Rolles et al., 2021; Stevens, 2019).

This demonstrates in part the political nature of evidence also in drug technology research. The current (inter)national drug policy climate would require not only more in-depth evaluation of the politicogenic drug effects of various drug policies, especially from a public health perspective (Csete et al., 2016) but also multi-criterion decision analysis that focuses on specific technologies, like cannabis and alcohol (Rogeberg et al., 2018) or non-medical heroin (Rolles et al., 2021) in specific country-contexts and regional policy environments (Hupli, 2020). Human enhancement drugs and their politicogenic drug effects should also be considered in relation to current drug policy and regulation debates (Bublitz, 2016; Hall & Strang, 2017) as '[T]he range of drugs being used for enhancement is increasing, with new substances often first emerging among groups already using established enhancement drugs' (Hope et al., 2021).

6. Discussion

How long the current dichotomy between promoted and prohibited drugs continues is difficult to predict. Even though the constructed boundary between 'bad drugs' and 'good medicines' is becoming increasingly evident, the author argues that 'drugs as instruments' framework by Müller and Schumann (2011) remains to be helpful to go beyond the dichotomy of good and bad drugs, or therapeutic and enhancement drugs. For future research in this field, it is argued to be important to further conceptualise all types of instrumentalised drugs as pharmacological technologies, whether used 'as tools for self-improvement' (Askew & Williams, 2021) or as just 'set of tools' (Oldani et al., 2014) humans use instrumentally in different life-situations (Müller & Schumann, 2011).

This is important because cognitive pressures in study and work contexts were requiring increasing capacities from our 'overflowing brains' (Klingberg, 2009; see also Kegan, 1994) already before the COVID-19 pandemic and user-oriented research was already showcasing more broadly the role that these technologies have in contemporary experiences and expectations of various populations (Coveney et al., 2019; Duff, 2015; Webster et al., 2009). Especially young users take decisive actions to effectively reduce potential harms from their use and to increase potential benefits, although not always successfully (e.g. Hardon, 2021; Hardon & Hymans, 2016; Hupli, 2021; Van Schipstal et al., 2016). Thus, empirical research in this area could focus among other things (1) whether people who use drugs perceive their use as treating something that is 'broken' or are they trying to enhance their capabilities to perform, feel and think better, (2) whether these perceptions correlate with actual effects, (3) inquire and inform about risks and benefits (4) design policy approaches accordingly. This type of end-user research is common place in other areas of technological consumerism and should become a standard also when it comes to pharmacological neurotechnologies, including pharmaceutical and other drugs.

While calls for increasing research and debate in this area does not mean that the use of human enhancement drugs should be explicitly promoted to encounter the demands of contemporary life, it is argued that the 'human enhancement drug' discussion and debate requires broader sociological analysis over benefits and harms of not only 'drugs' but also 'drug policies' in this era between drug prohibition and promotion. This paper aimed to contribute to that discussion, but further research and public debate is needed as there are already numerous real-life consequences for these categorical distinctions between recreational, therapeutic and enhancement use, for instance eligibility for medical services and insurance coverage (Daniels, 2000) and loss of civil liberties especially for certain ethnic groups (Alexander, 2010).

To emphasise, the use of some pharmacological technologies, like prescription pharmaceuticals without a medical diagnosis, let alone use of 'illicit drugs' for enhancement use or otherwise, has serious legal consequences as their use is criminalized in most countries that have ratified the UN conventions on 'drugs' (Tupper, 2012). And while there have been some theoretical speculations on how to legally regulate the enhancement use of for instance Ritalin[TM] and Adderall[TM] in the bioethical literature (e.g. Dubljevic, 2013; Greely et al., 2008; Hall & Strang, 2017; Schermer et al., 2009), the 'enhancement drug' debate still awaits to happen on several national and international levels (Hupli, 2020). This is despite that as Helén argued in 2004 (p. 4) 'Today, the focus of advancing medical technology is less on human mortality and protection of vital processes than on life enhancement'. When it comes to life enhancement with certain technologies, like drugs, this technological advancement is facing several challenges (Morrison, 2015, p. 4; Rose, 2007), legality of the activity being one of them in relation to 'illegalised drugs'.

In another words, legally allowing certain pharmacological technologies would require significant changes in (inter)national drug policy regulations, which does not seem to reflect the realities of current drug policy debates, and often neglected in the academic literature around pharmacological neuroenhancement (Bublitz, 2016; Hall & Strang, 2017). Most psychoactive drug use that is currently categorized to go beyond medical or scientific purposes, like 'enhancement

drugs', remains not only prohibited, but in many countries severely punishable, reflecting the yet fairly 'underground' nature of this type of technology use. This also complicates public health and harm reduction practices (Csete et al., 2016; Haden et al., 2016; Hardon & Hymans, 2016).

Additionally, even before the current pandemic, an enormous gap existed between the ability of different populations to access even 'life-saving' pharmacological technologies (e.g. Eriksen, 2016; Petryna & Kleinman, 2006) let alone 'life-enhancing' ones. This has not been fully addressed in the bioethical or empirical literature on enhancement drugs (Pickersgill & Hogle, 2015), pharmaceuticalisation (Williams et al., 2011), or in social policy and practice.

7. Conclusion

It has been argued that a STS –approach to drugs, partly inspired by anthropology of pharmaceuticals and critical drug studies, is a useful framework to explore the role of drug technologies in the everyday life of users. And even more broadly, how these technologies impact and interact with us in society, as well as what impact their policing has. This type of framework can give sufficient 'critical distance' not only to the enhancement debate (Askew & Williams, 2021; Morrison, 2015) but also to the more general drug policy debate, discussion and practice as 'drug issues require carefully considered, situated modes of intervention that work with the micro-processes of drugged assemblages' (Dennis & Farrugia, 2017, p. 89).

The author has argued that framing drugs as instruments or pharmacological technologies partly helps to approach both legalised and illegalised drugs, and especially their users, without the normative and moral judgements often attached to them (e.g. Duff, 2015; GCDP, 2017; IDPC, 2018; Tupper, 2012). This could not only reduce harm but produce well-being (see Dennis & Farrugia, 2017) and caring (Duff, 2015, 2017), perhaps even enhancements.

A theoretical framing that looks at enhancement drugs as instruments or technologies, and which takes seriously the role of drugs as 'nonhuman actors' in the co-production of various life situations, can shed light into the various individual and societal perceptions, reactions and restrictions regarding this type of use of 'technologies of the self' (Foucault, 1997) and the ethics of self-care involved (Duff, 2015). Thus, researching human enhancement and other drugs from this type of STS approach can offer 'the opportunity to explore different articulations of 'progress' encoded in debates around enhancement and ultimately to relate the narrow discussion of contemporary 'biotechnological' enhancement to the older, broader concepts of social enhancement' (Morrison, 2015, p. 23; also Pickersgill & Hogle, 2015).

This can also bring insights to the human enhancement drug debate which according to Morrison back in 2015 (p. 4), had 'been somewhat neglected by scholars in the fields of STS and the sociology of technology'. Thus, to further develop this scholarly field it has been argued that framing drugs as technologies, as many scholars have already done in some form (e.g. Askew & Williams, 2021; Coveney et al., 2011; Oldani et al., 2014; Pienaar et al., 2020; Rose, 2007; Williams et al., 2011) can help link the human enhancement technology debate to STS literature more generally.

To conclude, it is important to keep a critical distance in the pharmacological neuroenhancement debate not only to the concept of enhancement itself (Askew & Williams, 2021; Morrison, 2015) but to current drug policies and practices, which prohibit some technologies while promote others 'for life' (Dumit, 2012; also Moncrieff, 2009). So-called 'smart drugs' will remain an idea(l), something to aim for but never fully achievable until we start having smarter drug policies. The complexity of this era we live in requires research on multiple levels, and social sensitivity to go beyond the static categories of 'drug use' or 'abuse' (Duff, 2015; Harris & Luongo, 2021), beyond 'bad drugs' and 'good medicines'. Looking 'objectively' at all drugs as pharmacological technologies offers one possibility for doing this as conceptualising all drugs as technologies can partly help to show how they function in society as nonhuman actors with myriad of effects, including politicogenic ones.

Note

1. In this context it would also be important to consider the embodied (Varela et al., 1991), extended (Clark & Chalmers, 1998) and/or social (e.g. Pickersgill, 2013) aspects of brain and cognition, not only for social theory but also for future clinical research but these aspects are largely left out from this paper.

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