

Self-Control in Responsibility Enhancement and Criminal Rehabilitation

Polaris Koi¹  · Susanne Uusitalo² · Jarno Tuominen^{3,4}

© The Author(s) 2017. This article is an open access publication

Abstract Ethicists have for the past 20 years debated the possibility of using neurointerventions to improve intelligence and even moral capacities, and thereby create a safer society. Contributing to a recent debate concerning neurointerventions in criminal rehabilitation, Nicole Vincent and Elizabeth Shaw have separately discussed the possibility of responsibility enhancement. In their ethical analyses, enhancing a convict's capacity responsibility may be permissible. Both Vincent and Shaw consider self-control to be one of the constituent mental capacities of capacity responsibility. In this paper, we critically examine the promise of improving convicts' capacity responsibility by neuroenhancements of self-control to see whether the special characteristics of the inmate population make a difference in the analyses. As improving self-control by means of neurointerventions seems plausible, we then ask whether it is or could be a justified measure in court rulings. We conclude that, even if there are cases in which neurointerventions were warranted in the context of the stated goals of the criminal court, i.e., decreasing recidivism and rehabilitating the offenders to the society, due to the range of individual variability in the constitution of self-control, the prescription of specific neurointerventions of self-control falls outside the scope of legitimate court rulings.

Keywords Responsibility · Enhancement · Rehabilitation · Criminal rehabilitation · Self-control · Neurolaw

✉ Polaris Koi
polaris.koi@utu.fi

¹ Philosophy, Department of Philosophy, Contemporary History, and Political Science, University of Turku, Turku, Finland

² Social and Moral Philosophy, Department of Political and Economic Studies, University of Helsinki, Helsinki, Finland

³ Centre for Cognitive Neuroscience, Department of Psychology and Speech-Language Pathology, University of Turku, Turku, Finland

⁴ Brain and Mind Center, University of Turku, Turku, Finland

1 Introduction

If future neuroscience could alter the moral and other capacities of humans, could these neuroenhancement technologies be used on convicted felons in order to promote rehabilitation and decrease recidivism rates? Some ethicists, such as Persson and Savulescu (2008) and Harris (2011), have debated the possibility of improving our moral faculties to either above average, or above what is currently humanly possible, thereby creating a safer society. A related prospect is the use of neurointerventions in criminal rehabilitation. While the use of what Douglas (2014, 2016) terms “neurocorrectives” may or may not overlap with moral neuroenhancement, both share the aim of a safer society and the approach of character improvement. Some courts already prescribe certain medical interventions, such as libido suppressants for sexual offenders, as part of criminal sentences.¹ Echoing the character-improvement agenda of moral enhancement, philosophers including Vincent (2014), Shaw (2013, 2014), Pugh and Douglas (2016, 2017), have all entertained and debated the prospect that future neuroscience would make it possible to improve the characters and capabilities of convicted felons. According to both Vincent and Shaw, one such capability to be modulated is responsibility.² The denotations of responsibility range from legal culpability to reliability of character but, in the context of criminal rehabilitation powered by neuroscience, two denotations have garnered the most interest. These are virtue responsibility, which refers to maturity and reliability of character, and capacity responsibility, which refers to the presence of mental capabilities necessary for responsible agency. To use Vincent’s example, a well-behaved eight-year-old can be described as “virtue responsible,” but not yet “capacity responsible”; likewise, a wayward teenager may already have the necessary mental abilities to count as capacity responsible, while he may not be virtue responsible (Vincent 2009, 2010).

While neurointerventions in criminal rehabilitation in general have been under somewhat wider discussion (see, e.g., Pugh and Douglas 2017; Greely 2008; Ryberg 2012), court-mandated improvement of a convict’s capacity responsibility, specifically, has been discussed by Vincent (2014) and Shaw (2014). Resting on the idea that responsibility tracks mental capacity, both Vincent and Shaw suggest that the improvement of mental abilities necessary for responsible agency improves capacity responsibility. However, they each say very little about what neural or mental states and processes precisely would be targeted by capacity responsibility-enhancing interventions. The mental abilities they each list as underlying capacity responsibility are *understanding* and *self-control* (Shaw 2014; Vincent 2009). Understanding and self-control are broad, yet distinct, phenomena. Hence, we believe that the neuroenhancement of each merits a distinct account. Enhancing understanding has been explored in Shaw (2013). In this paper, we critically examine the promise of improving convicts’ capacity responsibility by neuroenhancements of self-control³ and whether it is or could be a justified measure in court rulings.

¹ For a review of neurointerventions in criminal rehabilitation, see Pugh and Douglas (2017).

² Others have also been suggested: for example, Pugh and Douglas (2017) point out that “recent research has suggested that pharmacological agents could be used to affect certain traits that are linked to criminal behavior, such as aggression, impulsivity, and the willingness to inflict harm on others.”

³ We choose to tackle self-control in this paper, because it has recently been under extensive study (see, e.g., Tabibnia et al. 2011; Kotabe and Hofmann 2015; Moffitt et al. 2011), which we can draw on in order to have an empirically informed conception of what self-control enhancement is, and would be, like; furthermore, we do this because problems in self-control have widely been associated with criminal propensity, an association we will elaborate on in Sect. 3.

Various definitions and conceptions of self-control are present in the discussion at hand. The two standard accounts of self-control define it as inhibition control (e.g., Muraven and Baumeister 2000), and as acting on a larger, later reward over a smaller, sooner one (e.g., Mischel and Ebbesen 1970; Fujita 2011). Our argument is compatible with any standard definition of self-control; see Sect. 3.2 for a broader discussion of the concept of self-control. By “neuroenhancements” of self-control, we refer to medical interventions that target the neurophysiological basis of self-control. The most obvious forms of such enhancements are psycho-active pharmaceuticals, including stimulants such as methylphenidate (Sripada et al. 2014), but neuroenhancements could also take the form of, for instance, transcranial stimulation (Hsu et al. 2011) and other brain intervention methods.

In what follows, we first review the current discussion concerning responsibility neuroenhancements in criminal rehabilitation. Neurointervention-based criminal rehabilitation has faced a variety of objections based on autonomy (cf. Caplan 2006), authenticity (Vincent 2014), and bodily integrity (Shaw 2016). In contrast to these objections, stemming from concerns regarding the possible agency-undermining consequences of the medical intervention on the convicted individual, Vincent (2014) and Shaw (2014) have discussed these interventions in terms of the aims, and justified scopes of action, of justice systems. We will address whether such enhancements can help further the aims of the state, namely decreasing recidivism and aiding individual rehabilitation, and whether their use for those aims is justified, as well as account for our focus on self-control enhancements specifically by discussing both the concept of self-control and the prospects of enhancing it. In this paper, we adopt a similar strategy to that of Vincent and Shaw, ultimately arguing that the prescription of specific neurointerventions of self-control falls outside the scope of legitimate court rulings.

2 Responsibility Neuroenhancements in Criminal Rehabilitation

As outlined above, and as Vincent (2009, 2010, 2014) has repeatedly demonstrated, the concept of responsibility has a number of different denotations. Vincent (2014) argues various senses of responsibility (e.g., blameworthiness and criminal responsibility) necessitate capacity responsibility, which in turn relies on the presence certain mental capacities, including self-control.

For an agent to be responsible for some specific action, the agent needs to be capable of the kind of responsibility at stake, which requires a range of mental capacities. While there are obvious differences in scope and demandingness between, say, characterizing someone as fully capacity responsible or holding them blameworthy for some specific, mundane action, responsibility assessments rely on the evaluation of whether certain mental capacities are present.

Noting that neuroscience has managed to outline the neural basis of a variety of mental capacities, Vincent (2010) argues that neuroimaging technologies may, in the future, help courts conduct responsibility assessments to evaluate whether a defendant is capacity responsible to the degree that they⁴ can held accountable for their act. She then goes on to suggest that future neuroscience may help restore or enhance a convict’s capacity responsibility, thereby helping the state prevent recidivism and furthering rehabilitation (Vincent 2014). However, she also voices a concern that neurointerventions intended to

⁴ Throughout this article, we use the singular “they” to refer to persons of unknown gender, instead of the more cumbersome and less inclusive “he or she.”

enhance responsibility may fail to do so because responsibility is also undergirded by a sense of authenticity, mental capacity ownership, and personal identity, which interventions may undermine. Due to this, she argues, *restored* mental capacities may fail to promote capacity responsibility.

Shaw (2014), echoing Vincent, holds enhancing capacity responsibility more likely to be permissible than the use of neurointerventions to enhance virtue responsibility, which she argues would amount to instilling the state's preferred values in the offenders in question, which would objectify them, treating them as means to an end—the end of decreased recidivism rates—instead of ends in themselves. Instead, Shaw holds that the enhancement of a convict's capacity responsibility via improving their understanding and self-control can help *enable* offenders to participate in rational moral dialogue, which in turn aids rehabilitation and reintegration. Furthermore, it can rehabilitate criminals whose criminal behavior is caused either by difficulties with delayed gratification, or by lapses in responding to reasons against breaking the law. Improving these capacities, Shaw argues, does not bind the subject to the state's preferred values, nor does it restrict their freedom of will by foreclosing the option of reoffending.

Shaw's approach draws on Vincent's (2009) distinction between virtue responsibility and capacity responsibility. Vincent defines virtue responsibility as being willing to "do the right thing" and to having a history of behavior that testifies to the fact that agents are willing to act conscientiously in general. Vincent uses the example of Jane, a "responsible little girl." "She gets up in the morning all by herself, she washes and gets dressed and even makes her own lunch, she doesn't fight with other kids at school, after school she does her homework, she cleans up after herself, she helps me make dinner, and she even looks out for her older brother John," all testifying to the virtue responsibility of Jane, despite that, being an eight-year-old child, she does not yet possess capacity responsibility (Vincent 2009, p. 115). By contrast, capacity responsibility entails having the prerequisite mental capacities, but does not necessarily entail virtue responsibility: someone fully capable of such responsible behavior depicted above may or may not behave conscientiously. In Shaw's view, whether one behaves virtue responsibly needs to be, ultimately, up to the agent in question. Improving capacity responsibility, however, may make it easier for an agent to choose to act conscientiously.

Shaw (2014) holds that the offender's informed consent is required for capacity responsibility enhancements. However, a number of concerns have been raised in the literature concerning whether informed consent is possible in the circumstances in question (see, e.g., Greely 2008). Responding to these concerns, Douglas (2014, 2016) has offered a way to circumvent this problem by arguing that requirements for consent are not invoked in the use of neurointerventions in criminal rehabilitation, given that they are not invoked in the case of incarceration, and that there is no compelling reason to require consent in the case of the former but not the latter. Douglas points out that attempts at such, e.g., invoking a right to bodily integrity, rely on factors that are not unique to brain interventions but are also present in the case of incarceration.

Concurring with Douglas, we hold that similar ethical concerns arise with respect to both neurointerventions and incarceration. One reason that many look into neurointerventions for solutions in criminal rehabilitation is that incarceration is typically not very effective in preventing recidivism or facilitating individual rehabilitation (cf. Criminal Sanctions Agency 2015). We worry that court-mandated self-control enhancements may have the same shortcoming.

3 Self-Control In and Out of Criminology

3.1 Self-Control in the General Theory of Crime

A correlation between poor self-control and criminal behavior has been observed in both psychology and criminology (see, e.g., Moffitt et al. 2011; Beaver et al. 2010; Wikström and Treiber 2007). In their seminal work, *A General Theory of Crime* (1990), Michael Gottfredson and Travis Hirschi have even proposed low self-control to be the source of all crime. Empirical evidence has since confirmed that low self-control, as defined in the General Theory of Crime, does correlate with and predict criminal behavior—although this effect has been found weaker than expected, especially in longitudinal studies (Pratt and Cullen 2000; Burt et al. 2006). Whether self-control fulfills its promise of explaining all criminal activity, evidence clearly suggests it to play an important role in the aetiology of criminal action.⁵

However, the precise role of self-control in the aetiology of criminal action is ambiguous. This is, in part, because of the various notions of “self-control”: it is often studied as either impulse control (e.g., Muraven and Baumeister 2000) or delayed gratification (e.g., Mischel and Ebbesen 1970), while others rely on more robust character trait conceptions of self-control. Gottfredson and Hirschi’s definition of “self-control” *in terms of* criminal propensity and delinquency is an exemplar of the latter notion. They start out describing “self-control” as the ability to defer gratification: “A major characteristic of people with low self-control is therefore a tendency to respond to tangible stimuli in the immediate environment People with high self-control, in contrast, tend to defer gratification.” (1990: p. 89.) However, they then proceed to elaborate on how the tendency to pursue immediate gratification is composed of six behavioral elements, out of which impulsivity is only one. The rest are described as temper, risk taking, self-centeredness, preference for simple solutions to problems, and preference for physical activity over more abstract, such as verbal, forms of action; these characteristics are best detected from the person’s history of behavior (Gottfredson and Hirschi 1990; Piquero 2008). While not identical, the picture of self-control painted by Gottfredson and Hirschi bears some resemblance to Vincent’s characterization of virtue responsibility. Self-control as defined by Gottfredson and Hirschi is a complex construct of characteristics rather than a specific capacity: all deviant behavior testifies to the poor self-control of the agent in question. Both are assessed, at least partly, by examining the past record of deviant or norm-conforming behavior; and both submit that an agent with good self-control, or a virtue responsible agent, will conform to a broad range of normative expectations. While this synergy between the General Theory of Crime (and the empirical studies affirming it) and Vincent’s conception of virtue responsibility strengthens the claim that responsibility enhancement may succeed in decreasing crime, in order to examine the role of self-control as a more defined, value-neutral capacity that factors into capacity responsibility, we need to conceive of self-control in a different way.

⁵ It is, nevertheless, unclear what kind of role self-control actually plays in bringing about the desired kind of action and preventing others. Is criminal action in general assumed to be so tempting that self-control is required to refrain from that action? If it is, is self-control considered something that is sufficient for prevention of criminal action? Is it, for instance, a muscle-like faculty that motivates the agent to a better life or ability to contemplate the feasible courses of action in a reasoned way?

3.2 Self-Control as a Capacity

Definitions and characterizations of self-control abound in the philosophical and empirical literature. They vary in terms of longitudinality, ranging from accounts describing self-control as a relatively stable character trait, virtue, or capacity (e.g., Gottfredson and Hirschi 1990; Baumeister and Exline 1999) to situational self-control, in which self-control is analyzed as a situational concept, referring to part of the decision-making process (Wikström and Treiber 2007). They vary in terms of the precise nature of the capacities or traits invoked, from accounts stressing inhibition control (e.g., Muraven and Baumeister 2000) to those in which the delay of gratification and the advancement of distal over proximal motivations plays a central role (e.g., Mischel and Ebbesen 1970; Fujita 2011). Finally, some accounts stress the environmental, context-bound elements of self-control by emphasizing the importance of environmental manipulation (e.g., Levy 2017; Duckworth et al. 2016; Pratt et al. 2004). Recently, Kotabe and Hofmann (2015) have proposed a model integrating these approaches to, or “components of,” self-control into a construct describing a complex deliberative process that involves both the neurobiology of the agent and the environmental constraints at play.

Finally, characterizations of self-control range from the non-normative (such as self-control as the inhibition of otherwise imminent impulses, regardless of the content of these impulses; see, e.g., Tabibnia et al. 2011; Cohen et al. 2013) to descriptions placing it firmly in the sphere of morality (e.g., Baumeister and Exline 1999). Most fall somewhere in between, displaying terminology intended as neutral, yet laced with normative notions (Horstkötter 2009, 2015).

Discussing self-control as something that can be a target of neuroenhancement only makes sense if self-control is a trait or capacity that can be neurobiologically manipulated, and that is relatively stable so that enhancements thereof are not too fleeting to be useful. Situational definitions of self-control, such as that of Wikström and Treiber, pose a challenge to this approach. Wikström and Treiber argue that, instead of being a trait of the agent, self-control emerges from the situation it is used in. However, even Wikström and Treiber (2007) allow that, while self-control itself is situational in character, it relies on executive functioning, which can in turn be improved in order to improve the subject’s chances at success in situational self-control.⁶

In the well-known Stanford marshmallow experiment, Walter Mischel and Ebbe B. Ebbesen approached the research of self-control via studying delayed-gratification behavior. Out of Mischel and Ebbesen’s test subjects, many of the children who successfully refrained from eating the marshmallow accomplished that task by turning their attention elsewhere, such as by singing, turning their backs to the marshmallow, or attempting to go to sleep (Mischel and Ebbesen 1970)—“These children seemed to

⁶ The reader may question whether this approach leads us to a similar situation regarding self-control enhancement as we had regarding responsibility enhancement in the first place, that is, whether self-control is a construct so complex that we need to examine enhancing its underlying capacities or traits one-by-one in order to understand what enhancing self-control would actually be like. As regards self-control, however, we argue that whether we adopt a situational or a character trait analysis of the concept of self-control, our endeavors to enhance self-control neurobiologically will involve the modulation of the executive capacities. In fact, that the executive functions are the underlying processes in self-control appears uncontroversial (see, e.g., Tabibnia et al. 2011; Corbett et al. 2009), whereas responsibility, even capacity responsibility, is a broader construct and involves a number of differently operating mental capacities, including the executive functions. We submit that, even if one conceptualizes self-control in terms of circumstances, enhancing the executive functions is likely to yield better self-control outcomes as long as the circumstances are conducive to self-control.

facilitate their waiting by converting the aversive waiting situation into a more pleasant non-waiting one” (ibid., p. 335), in other words, into one where exercising self-control was no longer necessary. The importance of environment and situation management in self-control situations has since been affirmed by a number of studies, including a recent study by Ent et al. (2015) showing that high trait self-control significantly predicts temptation avoidance, both in an experimental setting and in self-reports. Drawing on these findings, among others, Levy (2017) has pointed out that people with high trait self-control appear not to be self-controlled but rather to exhibit a range of skills or practices enabling them to avoid using their self-control altogether, along with opportunities for employing these skills. This analysis relies on a distinction between self-controlled behavior and willpower as the related (neuro)psychological trait of the agent, in which the frequency of the former may not track the strength of the latter. This distinction is further supported by the role of targeted, skills-based behavioral interventions (Knouse and Safren 2010) and environmental manipulation in the context of managing disorders that impair self-control, such as Attention Deficit Hyperactive Disorder (ADHD) (see, e.g., Barkley 1997). More modestly, the many self-help techniques available for people willing to improve their self-control also contribute towards showing that self-control is a product of the interaction of neural processes with the environment: it involves a set of practices, and can be both aided and hampered by environmental and social factors.⁷

Despite the importance of the environment, the empirical research does not imply that self-control could not be neurobiologically enhanced—quite the contrary. There is evidence that, while forms of self-control differ, they share a neurobiological substrate (Tabibnia et al. 2011; Casey et al. 2011)—a substrate that may be modulated in order to improve self-control. Furthermore, Berman et al. (2013) were able to predict whether a person was in the low or high self-control group with 71% accuracy, based on the dimensionality analyses of their brain networks while undergoing a working memory task. To give an example of self-control enhancement already in use, methylphenidate and other substances used to alleviate the symptoms of ADHD have a strong track record in improving the self-control abilities of people with ADHD, a disorder that has been characterized as a disorder *of* self-control (Barkley 1997).⁸ The neuroscientific advances in understanding the neural mechanisms involved in self-control, together with the strong

⁷ While self-control has often been accounted for as the control of the self by the self, it is not dependent on the absence of control by others. Someone or something can control the agent, causing the agent to control herself. We may exercise self-control under coercion, brainwash, and other kinds of pressure.

⁸ Relevant to our discussion, see a large Swedish study that found ADHD medication to reduce criminality associated with male ADHD (Lichtenstein et al. 2012). It should be noted, however, that recently the exact benefits and long-term efficacy of the medication in ADHD children and youth have been questioned. Some studies indicate the effects seemingly to focus on teacher or parent evaluations of perceived academic performance, not on performance or symptoms themselves (for a recent review, see Storebø et al. 2015). Other studies have found the effects of ADHD medication to either disappear over time (Jensen et al. 2007; Molina et al. 2009; Langberg and Becker 2012) or, in one study, even deteriorate academic performance (Currie et al. 2014). This discussion could, however, also have other societal or cultural factors in the educational system, which may explain it being somewhat at odds with current clinical practice, and the perceived effects of stimulant medication (for a broad review, see Baroni and Castellanos 2015). When considered as a possible cognitive enhancer, methylphenidate has been found to prevent self-control depletion in a simple inhibition task in healthy volunteers (Sripada et al. 2014). Another ADHD stimulant, mixed amphetamine salts (Adderall), on the other hand, was found to have only a small effect on various cognitive measures, including no effect on inhibitory control, despite the subjects’ self-perceived enhancements (Ilieva et al. 2013). While both medications target the epinephrine and dopamine systems, the differences in effects can be due to either different psychopharmacological properties or study design, and clearly calls for further research (for a critical look at cognitive enhancers in general, see Zohny 2015).

track record of existing medical interventions on self-control, point towards the idea that, regardless of self-control's involvement of environmental management and situational factors, it is a promising candidate for an ability to be enhanced neurobiologically with both existing and future neuroscientific means. We grant Vincent's and Shaw's assessments that self-control contributes towards capacity responsibility. This suggests that it might well be possible to improve an agent's capacity responsibility by neurobiologically enhancing their self-control. This raises questions as to whether these interventions can help further the aims of the state, that is, to decrease recidivism and aid individual rehabilitation, and whether they can permissibly be used to do so.

4 The Goals of the State

The two goals of the state evoked in the debate on neurointerventions in criminal rehabilitation are, first, decreasing recidivism rates; and second, rehabilitating individual criminals into society. These tasks have been found challenging. Shaw expresses concern about "a pressing need to develop more effective ways of re-integrating offenders back into society" (2014: p. 1). Gottfredson and Hirschi "see little hope for important reductions in crime through modification of the criminal justice system," such as by means of rehabilitation programs (1990: p. XVI, 268–269). Could neurointerventions offer a novel means to help the state accomplish these two goals?

It is important to notice that, while rehabilitation may contribute towards decreased recidivism rates, these are fundamentally different goals. The goal of decreased recidivism works in the sphere of policy. It aims to decrease the statistical likelihood of recidivism, thereby decreasing frequency of crime, and improving the safety of the society. Individual rehabilitation, by contrast, is concerned with the well-being of the criminal offender in question, treating the offender's quality of life as an end in itself. We can imagine a society where offenders have not been rehabilitated, but they are nevertheless prevented from reoffending, say, by physically restraining them for life; likewise, an offender who has been fully rehabilitated and happily leads the life of a model citizen may still reoffend if placed in circumstances where no other viable courses of action are present. In the first of these two imagined scenarios, a safer society has been successfully created, but at the cost of treating the convicts as means to that end. In the second scenario, the goal of rehabilitating the individual has successfully been promoted, whereas recidivism has not been prevented. While these often go hand-in-hand, the distinction is worthwhile in ethical discussions of criminal rehabilitation methods. We therefore address self-control neuroenhancements' prospects in promoting each goal in turn.

4.1 Decreasing Recidivism Rates via Self-control Neuroenhancements: Feasibility Concerns

The promise of self-control enhancements in decreasing recidivism rates can be formulated in two, complementary ways.⁹ The first way is to tackle self-control as a component of capacity responsibility, to echo both Shaw and Vincent:

⁹ We present the reader with both the argumentative line stemming directly from self-control, and with the argument following Vincent's and Shaw's discussions of capacity responsibility because while the appeal directly to self-control is more attractive in its simplicity, we find the concept of capacity responsibility draws out a more nuanced conception of agency in the subjects.

- (1) Self-control can be improved by means of neuroenhancements.
- (2) Improving individuals' self-control improves their capacity responsibility.
- (3) Improving criminal offenders' capacity responsibility decreases the likelihood of their reoffending.

Therefore, by using neuroenhancements that improve the self-control of criminal offenders, we improve their capacity responsibility and decrease recidivism rates.

Another possible formulation postulates a direct relationship between self-control and recidivism:

- (1) Self-control can be improved by means of neuroenhancements.
- (2b) Improving criminal offenders' self-control decreases the likelihood of their reoffending.

Therefore, by using neuroenhancements that improve self-control on criminal offenders, we decrease recidivism rates.

We accept premise (2), agreeing with both Shaw and Vincent that self-control is one of the abilities on which capacity responsibility is reliant.¹⁰ It is premises (1) and (3)/(2b) about which we are concerned.

Premise (1) appears uncontroversial. Existing neurological means, as well as the growing body of knowledge about the neurobiological foundation of self-control, testify to the malleability of self-control by means of neurointerventions. However, due to the importance of environmental factors in self-control, the results of neurointerventions of self-control are uncertain. Before returning to this point, we will discuss premises (3) and (2b).

Concerning premises (3) and (2b), it appears statistically correct that low self-control is a criminogenic factor (Pratt and Cullen 2000; Moffitt et al. 2011). However, we would like to present some concerns arising from the fact that certain crimes are not committed due to low self-control. Rawn and Vohs (2011) outline how expected social rewards may motivate agents to employ their self-control and engage in risky, harmful, and criminal behaviors. Certain crimes are calculated, or products of rational behavior, from the shoplifter who could not otherwise afford a balanced diet to politically motivated murders. It appears that, in many cases, ranging from civil disobedience and activism, to crime done for pressing prudential reasons, and politically motivated crimes, improving capacity responsibility would be unlikely to decrease the likelihood of reoffending.¹¹ We therefore stress that, insofar as we aim to decrease recidivism, the improvement of self-control or of capacity responsibility in criminals is applicable only to those criminals for whom poor self-control or poor capacity responsibility *does* underlie their criminal behavior.

However, this may be a significant enough majority to render these concerns minor, especially if we are able to detect which criminals fall into the group where self-control

¹⁰ There may be certain constraints to the capacity responsibility-improving effect of self-control enhancement. These include upper and lower thresholds, above or below which changes in self-control produce no change in capacity responsibility; and prerequisites, including certain criteria for the subject's understanding (recall Vincent's characterization of capacity responsibility as based on understanding and self-control) in order for changes in self-control to be effective in altering their capacity responsibility. However, these constraints are minor. It is standard for a medical procedure, which neuroenhancements are, to have its set of cases where it is inapplicable. This does not detract from its value.

¹¹ Some may even worry that, by improving criminals' self-control, we would end up with more successful criminals, i.e., criminals who are better at committing their crimes while avoiding detection.

improvement is a viable intervention, and which do not.¹² For this reason, we consider this concern supplementary to our main concern, which has to do with premise (1), and to which we now turn.

Above, we discussed existing medical means for modulating self-control, and found self-control a promising target for neuroenhancement. However, we have reservations about whether this is so when the target group is criminal offenders. Namely, we wish to point out that there are factors that must be given due consideration in assessing whether self-control neuroenhancements, even if they were largely feasible and effective in the general population, are likely to be as effective in criminal offenders.

For many criminals, their lives are not going well. Neurodiversity and mental health diagnoses are common in convicted criminals. According to the Finnish Criminal Sanctions Agency, 25% of Finnish inmates have ADHD, and 90% have been diagnosed with some mental or neurological condition (Criminal Sanctions Agency 2015). Among these, learning disabilities such as dyslexia are common: in Finland, 33% of inmates have dyslexia and even more have poor literacy skills (*ibid.*). Mental health disorders are also overrepresented in the prison population in the United Kingdom (Ministry of Justice 2013), and 20–30% of all UK inmates have learning disabilities (Loucks 2007). Many mental disorders diminish self-control ability to some degree (*cf.* Cohen et al. 2013), and, in the case of ADHD, self-control is significantly impaired (*cf.* Barkley 1997). From this, we can infer that a large number of inmates have deficiencies in self-control.

In addition, many convicts may not have access to the basic prerequisites of human flourishing, such as nutrition, safety, and shelter, and have little control over their living circumstances. Homelessness is overrepresented in prison populations: in Finland, 12–14% of inmates have no fixed address, while in the UK, 15% of new convicts report being homeless prior to incarceration (Criminal Sanctions Agency 2015; Ministry of Justice 2012). In summary, we can safely say that a large number of convicts face a challenging combination of economic and social disadvantage, including mental health problems and neurodiversity.

This is a markedly challenging context for neuroenhancements of self-control because, as discussed above, self-control does not stop in neuroanatomy: it also depends on a variety of practices to a great extent. Consider, for example, people with ADHD, for whom neurointerventions in the form of stimulant medication often help improve their self-control. The medication alone does not do the trick: the patient also needs to set up practices that help them structure their environment (*cf.* Levy 2017; Kotabe and Hofmann 2015). The increase in dopamine levels caused by stimulant medication facilitates this behavior change, which may aid the patient in the task of structuring their environment, such as by setting in place behavioral constraints and nudges. By contrast, if we did modify convicts' neuroanatomy in a similar way, would those living in hardship have access to establishing and maintaining the kinds of practices on which self-control relies?

Again, some of them are likely to succeed; additionally, those convicts whose living conditions are stable enough to facilitate these practices would not face this problem. However, the prevalence of conditions that may hamper self-control practices in the criminal population raises concerns about whether self-control neuroenhancements, even if predominantly effective in the general population, would have a high likelihood of success in improving self-control in the criminal population. Furthermore, would the circumstances

¹² Naturally, offenders cannot be neatly divided into two groups: in many cases, the aetiology of crime may involve both deficiencies in self-control and/or capacity responsibility, and environmental factors, such as social pressure towards crime.

of successfully responsibility-enhanced offenders make it likely that they reoffend despite having improved self-control [given our concerns regarding premises (3) and (2b)]? In light of these concerns, we remain skeptical about the prospects of self-control enhancements for decreasing recidivism rates. Recall that what is attractive about court-mandated self-control neuroenhancements is that it would enable the application of enhancements to a large number of convicts, hopefully resulting in a substantially safer society.¹³ In the case of a program with a widespread positive impact on public safety, the presence of some instances of ineffective, enforced intervention may be considered an acceptable adverse effect (see Pugh and Douglas 2016). We will further discuss the ethics of mandatory ineffective interventions in Sect. 5. While the intervention may succeed in improving the self-control of some individuals, there is no indication that this would have fairly consistent results in decreasing recidivism. The resulting improvement in public safety may therefore remain too small to warrant instituting a program where court-mandated neurointerventions become part of criminal sentencing by default.

4.2 Individual Rehabilitation via Self-control Neuroenhancements: Feasibility Concerns

Now that we have discussed our concerns regarding whether self-control enhancements would succeed in decreasing recidivism rates, we can move on to the state's other goal: criminal rehabilitation. This is the individual-centered goal of the justice system, where the subject is not discussed merely as statistics or in terms of their contribution to public safety; instead, the aim is to help each individual find a way to lead a satisfactory life while avoiding crime. The argument for using self-control neuroenhancements for criminal rehabilitation can be summed up as follows:

- (1) Self-control can be improved by means of neuroenhancements.
- (2) Improving individuals' self-control improves their capacity responsibility.
- (3) Improving some criminal offenders' capacity responsibility helps their rehabilitation, reintegrating them into society and decreasing the likelihood of future crime.

Therefore, by applying neurointerventions that improve self-control on some criminal offenders, we help their rehabilitation, reintegrate them into society, and decrease the odds for reoffending.

Alternatively, echoing Gottfredson and Hirschi's General Theory of Crime, a more direct link between self-control improvement and rehabilitation can be made, omitting the role of capacity responsibility:

- (1) Self-control can be improved by means of neuroenhancements.
- (2b) Improving some criminal offenders' self-control helps their rehabilitation, reintegrating them into society, and decreasing the likelihood of future crime.

Therefore, by applying neurointerventions that improve self-control on some criminal offenders, we help their rehabilitation, reintegrate them into society, and decrease the odds for reoffending.

¹³ To be clear, we do not argue that, if these interventions were largely successful, they should be prescribed by courts; rather, we have a number of concerns about this, many of which fall outside the scope of this paper, and have been dealt with elsewhere in the literature. We only stress feasibility over arguments regarding concerns, such as personal autonomy and treating people as mere means to ends because we choose to restrict ourselves to points arising specifically with regard to self-control enhancement—although similar points may arise with regard to other kinds of court-mandated medical interventions.

In this approach, no statistically large difference in recidivism rates is aimed at. Rather, the promise is that courts could include self-control enhancements as part of some criminal sentences, although how it would be discerned which criminal offenders on which to apply self-control neurointerventions is a point up for debate.

Using medical interventions as part of criminal sentences is not a new idea. For example, in some legislations, chemical castration is used as part of criminal sentences for sex offenders. Along the same lines, self-control neuroenhancements might, in the future, constitute part of the criminal sentence in crimes that are often thought to be due to self-control failure.

Reminding ourselves of the above discussion on the relationship between self-control and crime, it is fair to assume that there is a large number of criminals whose reintegration process would benefit from the improvement of self-control and of capacity responsibility. But, again, we are faced with the same concerns regarding the first premise as with the scenario regarding decreasing recidivism rates. The fact that many convicts would, due to their adverse life circumstances, be hampered in their ability to carry out the behavior changes necessary for the improvement of self-control in practice raises concerns that self-control neurointerventions may be unsuccessful in the context of criminal rehabilitation, save for some cases.

This is a good place to tackle one more argument for the use of neuroenhancements in a scenario like this. Recently, Ray (2016) has proposed that stimulants could be used for opportunity maintenance on healthy but socially disadvantaged subjects, in order to “level the playing ground” and giving underprivileged students opportunities they would otherwise lack. Applied to the context of self-control enhancements in criminal rehabilitation, given that many offenders come from underprivileged backgrounds, could self-control enhancements be used to remedy part of the effect of those backgrounds, thereby helping these individuals access life options that would otherwise be beyond their reach? This novel approach has also raised concerns, such as ones concerning feasibility (Erler 2016) and self-pathologization (Stevenson 2016). While framing neuroenhancements as a way to alleviate the burden of disadvantage appears to increase the attractiveness of self-control enhancements in criminal rehabilitation, it does not alleviate our concerns stemming from an understanding of self-control as requiring environmental scaffolding. In what follows, we propose that the benefits that self-control enhancement may have for some individuals could plausibly be reaped in the context of individual rehabilitation—but not in the criminal court.

5 Legitimate Self-Control Neuroenhancements in Criminal Rehabilitation: An Ethical Argument

The above discussion so far appears to leave us tied. On one hand, the robust connections between self-control and crime suggest that self-control enhancement, if successful in improving convicts’ self-control, could be a promising means of rehabilitation; on the other, the prospects of neuroenhancement in large-scale criminal rehabilitation appear gloomy. The mandated use of neurocorrectives should be limited to those offenders who can be expected to benefit from the intervention. We argue that these measures are best exercised by placing them outside the domain of criminal justice, and inside that of medical care.

A source of much debate in the use of medical interventions as part of criminal sentences is that the question lies at the intersection of medical ethics and criminal justice ethics. Medical ethics stresses the importance of beneficence, non-maleficence, and informed consent and holds any intervention that risks harming the patient without obvious benefits to the patient ethically suspect, and doubly so if done without consent. Meanwhile, in the sphere of criminal justice ethics, it is standard to believe that we may be justified in inflicting some harm on criminals; doing some things that are not beneficial to them in order to benefit others; and doing things to them without their consent, such as forcibly imprisoning them. This friction is apparent in a number of debates, such as the debate on whether convicts can give valid consent to neurointerventions, and whether consent is indeed even required (cf. Shaw 2014; Douglas 2014; Pugh and Douglas 2016). It would greatly clarify matters if we could place self-control neurointerventions firmly in the sphere of either medical or criminal justice ethics.

We assume that, out of the schoolbook purposes of the criminal justice system—punishment, deterrence, rehabilitation, and decreasing recidivism—rehabilitation is the one that self-control neuroenhancements stand a chance of furthering.¹⁴ Therefore, whether self-control neuroenhancements can be considered to promote any of the aims of criminal justice hinges on whether they are applicable for criminal rehabilitation by criminal courts. We have reservations about this, and argue for these reservations as follows:

- (1) Medical interventions need to be reasonably effective in benefitting the patient in order to be considered criminal rehabilitation.
- (2) In order for a neurointervention of self-control to be likely to succeed in improving the patient's self-control, the patient's individual circumstances need to be such that they facilitate setting up practices that allow for self-control.
- (3) Criminal courts are ill equipped to assess whether the convict's individual circumstances facilitate setting up practices that allow for self-control, or to change those circumstances to that end.

Therefore, neurointerventions of self-control, if prescribed by criminal courts, cannot be considered part of criminal rehabilitation.

However, neurointerventions of self-control can be very useful when the subject's circumstances are such that a self-control neurointervention is likely to succeed. Consider, for example, stimulant medication for ADHD: while it does not succeed in helping all people with ADHD, its success rate is high enough that prescription is considered legitimate.¹⁵ This is likely to be largely so because patients live in circumstances that enable them to develop practices of self-control. In these circumstances, the neurointervention can make a vast difference for the subject, making the subject better equipped to pursue any life plan they have. This does not foreclose the option of reoffending, but it can decrease its likelihood by improving the subject's chances in pursuing other courses of action. We

¹⁴ This relies on the widespread idea that the purposes of criminal justice are rehabilitation (divided, in our analysis, to decreasing recidivism and individual rehabilitation), retribution, incapacitation, and crime deterrence (Alschuler 2003). We argued above that this is not a promising way to further the goal of decreasing recidivism rates. In our view, if retribution is necessary, neurointerventions are not needed for it, given that there exist more than enough means for inflicting suffering. We also assume that self-control neuroenhancements are a poor incapacitator and a poor deterrent of crime.

¹⁵ Recently, however, a meta-analytical Cochrane Review on the efficacy of methylphenidate on children and adolescents with ADHD has cast light on the quality and implications of this research, highlighting that the effectiveness of methylphenidate treatment in children and adolescents remains uncertain; see Storebø et al. (2015).

therefore need a policy that would allow us to find out when the requirements for a successful self-control neurointervention are met. One possibility, in the sphere of mental health care, would be that, if properly trained, a team of medical professionals and social workers could be equipped to assess, with a reasonably high success rate, whether a subject's circumstances facilitate self-control; depending on available resources, the subject's living circumstances may furthermore be improved upon in order to facilitate this. The intervention can furthermore be supported with behavioral therapy in order to help establish the practices involved in self-control.

Many criminal justice systems currently use medical practitioners and social workers to inform at least some of their decision-making. For example, in the UK, expert witnesses may be called upon by the police, the prosecution, and the defense (Milroy 2003). This raises a question: would it not suffice that a multidisciplinary group of medical and social work experts be employed by the court to assess whether an individual meets criteria for intervention, and to lay out the parameters of the intervention prescribed by the court?¹⁶ Giving this multidisciplinary group sufficient autonomy in making decisions about subsequent interventions would alleviate our concern about the inability of criminal courts to engage in tasks that require medical and social work expertise. However, we have two concerns about this arrangement. First, we worry about whether the context of court interaction would facilitate a therapeutic relationship between the convict and the medical and social work professionals involved. Second, and more importantly, court-mandated interventions are remarkably rigid. Should a criminal sentence require an intervention, say, by means of pharmaceuticals for the duration of five years, if the intervention were to be found unwarranted after one year, whether due to its remarkable efficacy, due to finding out it is ineffective in this case, or due to the circumstances of the convict no longer facilitating self-control, the convict would nevertheless be required to continue consuming the pharmaceuticals for the remainder of the sentence. This is especially problematic if adverse side effects are involved but, even if not, it already involves harms by virtue of undermining autonomy without facilitating either rehabilitation or public safety—harms that the beneficial outcomes of criminal rehabilitation may render acceptable, but that are indefensible if none of the goals of the criminal justice system end up being promoted. These considerations constrain the capacity of criminal courts to effectively further its own aims by prescribing neurocorrectives, even if expert advice is employed.

We submit that all a criminal court can legitimately include as part of the judgment is a requirement to visit a mental health practitioner for assessment. However, the form, content, and duration of any subsequent mental health care should be up to the patient and the medical professionals involved. Assessing whether this treatment may permissibly be involuntary should be conducted in accordance with the same ethical guidelines as in involuntary mental health care for non-offenders.¹⁷ Given that criminal courts are poorly equipped to conduct tasks that require medical and social work expertise, for them to prescribe the specific form or duration of mental health care, such as a self-control

¹⁶ We thank an anonymous reviewer for this point.

¹⁷ While these guidelines vary on a regional basis, and are subject to debate and improvement, a good example of such a guideline is listed in the objectives of The European Mental Health Action Plan (WHO 2013): "All steps should be taken to promote voluntary admission and treatment, and avoid coercion, while guaranteeing protection in accordance with international and national human rights instruments. Strong safeguards need to be in place if involuntary admission and treatment are deemed necessary, including independent reviews, inspection of the conditions under which people are detained and access to complaints procedures, independent legal advice and other relevant support."

neuroenhancement, runs the risk of overstepping the purpose of the criminal justice system, into the domain of illegitimate use of power.

6 Conclusion

Capacity responsibility tracks certain mental capacities, as Vincent and Shaw submit in their discussions of responsibility enhancement. Therefore, it is the relevant mental capacities that we need to examine in order to determine whether responsibility can indeed be enhanced. It is highly plausible that self-control is indeed one of the key capacities on which capacity responsibility hinges.

Self-control enhancement appears both feasible and attractive in the context of those with disorders of self-control as well as the general population. Insofar as improved self-control yields improved capacity responsibility, and capacity responsibility inversely correlates with criminality, its availability may even provide decreased crime rates. However, self-control neuroenhancements may be unsuccessful in improving self-control in criminal offenders who may lack the skills required to establish the kinds of practices of environmental manipulation that self-control behaviors necessitate, or whose environments may not be conducive to self-control practices.

Given the concerns that self-control neuroenhancement raises, as well as its attractiveness when successful, it both merits and requires further empirical study. Neuroscientific research has mostly looked at simple inhibition or delayed gratification tasks, without engaging with other aspects of self-control. The psychopharmaceuticals currently used, for example, as cognitive enhancers are likely to have more to do with maintaining vigilance and attention than with more complex issues related to self-control, such as future-oriented thinking and causal reasoning. These effects are still little studied, and conclusions drawn from them should be cautious (Zohny 2015). Furthermore, current techniques such as brain stimulation or medication usually have effects that are short-lived and could not as such be considered to reliably cause a lasting enough change to present an alternative to other measures of the criminal justice system. Our contribution has mainly served to highlight this need. The idea of enhancing criminal offenders' capacity for being responsible for their actions sounds like a desirable goal but, as things currently stand, it remains an idea that still necessitates more empirical and conceptual work. As our understanding of the neurobiology of self-control increases, the medical means of modulating self-control may improve in efficacy. But, however thoroughly we understand their neural correlates, self-control practices remain decidedly context-dependent and environmental in character. An individual-centric approach where self-control neuroenhancements are viewed in terms of health care rather than in terms of the justice system thus appears both more effective and more ethically sustainable.

Acknowledgements This paper stems from the authors' participation in "Improving Ourselves as Moral Agents: The Ethics and Neuroscience of Self-Control" cluster group, which was part of the John Templeton-funded Philosophy and Science of Self-Control research project. The authors would like to thank the research project and everyone who participated in the activities of our cluster group. This paper has benefited from comments from Jaakko Kuorikoski, Jukka Varelius, Juha Räikkä, and from participants in the Oxford Applied Ethics Discussion Group and in the Turku Practical Philosophers' Club (Klubi). Finally, Polaris Koi would like to thank the Finnish Cultural Foundation for research funding.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution,

and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

- Alschuler, A.W. (2003). The Changing Purposes of Criminal Punishment: A Retrospective on the Last Century and Some Thoughts about the Next. *University of Chicago Law Review* 70(1): 1–22.
- Barkley, R.A. (1997). *ADHD and the Nature of Self-Control*. New York: The Guilford Press.
- Baroni, A., & Castellanos, F.X. (2015). Stimulants, cognitions and ADHD. *Current Opinion in Behavioral Sciences* 4: 109–114.
- Baumeister, R.F., & Exline, J.J. (1999). Virtue, Personality and Social Relations: Self-Control as the Moral Muscle. *Journal of Personality* 67(6): 1165–1194.
- Beaver, K.M., DeLisi, M., Vaughn, M.G., & Wright, J.P. (2010). The Intersection of Genes and Neuropsychological Deficits in the Prediction of Adolescent Delinquency and Low Self-Control. *International Journal of Offender Therapy and Comparative Criminology* 54(1): 22–42.
- Berman, M.G., Yourganov, G., Askren, M.K., Ayduk, O., Case, B.J., Gotlib, I.H., Kross, E., McIntosh, A.R., Strother, S., Wilson, N.L., Zayas, V., Mischel, W., Shoda, Y., & Jonides, J. (2013). Dimensionality of brain networks linked to life-long individual differences in self-control. *Nature Communications* 4(1373): 1–7. doi:10.1038/ncomms2374.
- Burt, C.H., Simons, R.L., & Simons, L.G. (2006). A Longitudinal Test of the Effects of Parenting and the Stability of Self-Control: Negative Evidence for the General Theory of Crime. *Criminology* 44 (2): 353–396.
- Caplan, A.L. (2006). Ethical issues surrounding forced, mandated, or coerced treatment. *Journal of Substance Abuse Treatment* 31(2): 117–120.
- Casey, B.J., Somerville, L.H., Gotlib, I.H., Ayduk, O., Franklin, N.T., Askren, M.K., Jonides, J., Berman, M.G., Wilson, N.L., Teslovich, T., Glover, G., Zayas, V., Mischel, W., & Shoda, Y. (2011). Behavioral and neural correlates of delay of gratification 40 years later. *Proceedings of the National Academy of Sciences of the United States of America* 108(36): 14998–15003.
- Cohen, J.R., Berkman, E.T., & Lieberman, M.D. (2013). Intentional and Incidental Self-Control in Ventrolateral Prefrontal Cortex. In D.T. Stuss & R.T. Knight (Eds.), *Principles of Frontal Lobe Function, 2nd Edition*. Oxford: Oxford University Press, 417–440.
- Corbett, B.A., Constantine, L.J., Hendren, R., Rocke, D., & Ozonoff, S. (2009). Examining executive functioning in children with autism spectrum disorder, attention deficit hyperactivity disorder and typical development. *Psychiatry Research* 166(2–3): 210–222.
- Criminal Sanctions Agency (2015). *Statistical Yearbook 2015 of the Criminal Sanctions Agency*. Helsinki: Rikosseuraamuslaitos.
- Currie, J., Stabile, M., & Jones, L. (2014). Do stimulant medications improve educational and behavioral outcomes for children with ADHD? *Journal of Health Economics* 37: 58–69.
- Douglas, T. (2014). Criminal Rehabilitation Through Medical Intervention: Moral Liability and the Right to Bodily integrity. *Journal of Ethics* 18(2): 101–122.
- Douglas, T. (2016). Nonconsensual Neurocorrectives and Bodily Integrity: A Reply to Shaw and Barn. *Neuroethics*. doi:10.1007/s12152-016-9275-6.
- Duckworth, A.L., Gendler, T.S., & Gross, J.J. (2016). Situational Strategies for Self-Control. *Perspectives on Psychological Science* 11(1): 35–55.
- Ent, M.R., Baumeister, R.F., & Tice, D.M. (2015). Trait self-control and the avoidance of temptation. *Personality and Individual Differences* 74: 12–15.
- Erler, A. (2016). Using Stimulants to Tackle Social Disadvantages: Interesting in Theory, Problematic in Practice. *American Journal of Bioethics* 16(6): 48–50.
- Fujita, K. (2011). On Conceptualizing Self-Control as More Than the Effortful Inhibition of Impulses. *Personality and Social Psychology Review* 15(4): 352–366.
- Gottfredson, M.R., & Hirschi, T. (1990). *A General Theory of Crime*. Stanford: Stanford University Press.
- Greely, H.T. (2008). Neuroscience and Criminal Justice: Not Responsibility but Treatment. *University of Kansas Law Review* 56(5): 1103–1138.
- Harris, J. (2011). Moral enhancement and freedom. *Bioethics* 25(2): 102–111.
- Horstkötter, D. (2009). *Self-Control Revisited: Varieties of Normative Agency*. Nijmegen: Radboud University Nijmegen.
- Horstkötter, D. (2015). Self-control and normativity: Theories in social psychology revisited. *Theory & Psychology* 25(1): 25–44.

- Hsu, T., Tseng, L., Yu, J., Kuo W., Hung D.L., Tzeng O.J.L., Walsh, V., Muggleton, N.G., & Juan, C. (2011). Modulating inhibitory control with direct current stimulation of the superior medial frontal cortex. *NeuroImage* 56(4): 2249–2257.
- Ilieva, I., Boland, J., & Farah, M.J. (2013). Objective and subjective cognitive enhancing effects of mixed amphetamine salts in healthy people. *Neuropharmacology* 64: 496–505.
- Jensen, P.S., Arnold, L.E., Swanson, J.M., Vitiello, B., Abikoff, H.B., Greenhill, L.L., Hechtman, L., Hinshaw, S.P., Pelham, W.E., Wells, K.C., Conners, C.K., Elliott, G.R., Epstein, J.N., Hoza, B., March, J.S., Molina, B.S.G., Newcorn, J.H., Severe, J.B., Wigal, T., Gibbons, R.D., & Hur, K. (2007). 3-Year Follow-up of the NIMH MTA Study. *Journal of the American Academy of Child & Adolescent Psychiatry* 46(8): 989–1002.
- Knouse, L.E., & Safren, S.A. (2010). Current Status of Cognitive Behavioral Therapy for Adult Attention-Deficit Hyperactivity Disorder. *Psychiatric Clinics of North America* 33(3): 497–509.
- Kotabe, H.P., & Hofmann, W. (2015). On Integrating the Components of Self-Control. *Perspectives on Psychological Science* 10(5): 618–638.
- Langberg, J.M., & Becker, S.P. (2012). Does Long-Term Medication Use Improve the Academic Outcomes of Youth with Attention-Deficit/Hyperactivity Disorder. *Clinical Child and Family Psychology Review* 15(3): 215–233.
- Levy, N. (2017). Of Marshmallows and Moderation. In W. Sinnott-Armstrong & C.B. Miller (Eds.), *Moral Psychology, Volume 5: Virtue and Happiness*. Cambridge: MIT Press, 197–214.
- Lichtenstein, P., Halldner, L., Zetterqvist, J., Sjolander, A., Serlachius, E., Fazel, S., Langstrom N., & Larsson, H. (2012) Medication for Attention Deficit-Hyperactivity Disorder and Criminality. *New England Journal of Medicine* 367(21): 2006–2014.
- Loucks, N. (2007). *No One Knows: offenders with learning difficulties and learning disabilities – review of prevalence and associated needs*. London: Prison Reform Trust.
- Milroy, C.M. (2003). Medical experts and the criminal courts: all relevant material must be disclosed, including facts detrimental to the opinion. *BMJ* 326(7384): 294–295.
- Ministry of Justice (2012). *Accommodation, homelessness and reoffending of prisoners: Results from the Surveying Prisoner Crime Reduction (SPCR) survey*. London: Ministry of Justice.
- Ministry of Justice (2013). *Gender differences in substance misuse and mental health amongst prisoners*. London: Ministry of Justice.
- Mischel, W., & Ebbsen, E.B. (1970). Attention in Delay of Gratification. *Journal of Personality and Social Psychology* 16(2): 329–337.
- Moffitt, T.E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R.J., Harrington, H., Houts, R., Poulton, R., Roberts, B.W., Ross, S., Sears, M.R., Thomson, W.M., & Caspi, A. (2011): A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the United States of America* 108(7): 2693–2698.
- Molina, B.S.G., Hinshaw, S.P., Swanson, J.M., Arnold, L.E., Vitiello, B., Jensen, P.S., Epstein, J.N., Hoza, B., Hechtman, L., Abikoff, H.B., Elliott, G.R., Greenhill, L.L., Newcorn, J.H., Wells, K.C., Wigal, T., Gibbons, R.D., Hur, K., & Houck, P.R., and the MTA Cooperative Group (2009). The MTA at 8 years: Prospective Follow-up of Children Treated for Combined-Type ADHD in a Multisite Study. *Journal of the American Academy of Child & Adolescent Psychiatry* 48(5): 484–500.
- Muraven, M., & Baumeister, R.F. (2000). Self-Regulation and Depletion of Limited Resources: Does Self-Control Resemble a Muscle? *Psychological Bulletin* 126(2), 247–259.
- Persson, I., & Savulescu, J. (2008). The Perils of Cognitive Enhancement and the Urgent Imperative to Enhance the Moral Character of Humanity. *Journal of Applied Philosophy* 25(3): 162–177.
- Piquero, A.R. (2008). Measuring Self-Control. In E. Goode (Ed.), *Out of Control: Assessing the General Theory of Crime*. Stanford: Stanford University Press, 26–37.
- Pratt, T.C., & Cullen, F.T. (2000). The Empirical Status of Gottfredssons and Hirschi's General Theory of Crime: A Meta-Analysis. *Criminology* 38(3): 931–964.
- Pratt, T.C., Turner, M.G., & Piquero, A.R. (2004). Parental Socialization and Community Context: A Longitudinal Analysis of the Structural Sources of Low Self-Control. *Journal of Research in Crime and Delinquency* 41(3): 219–243.
- Pugh, J., & Douglas, T. (2017). Neurointerventions as criminal rehabilitation: An ethical review. In J. Jacobs & J. Jackson (Eds.), *The Routledge Handbook of Criminal Justice Ethics*. Abingdon: Routledge, 95–109.
- Pugh, J., & Douglas, T. (2016). Justifications for Non-Consensual Medical Intervention: From Infectious Disease Control to Criminal Rehabilitation. *Criminal Justice Ethics* 35(3): 205–229.
- Rawn, C.D., & Vohs, K.D. (2011). People Use Self-Control to Risk Personal Harm: An Intra-Interpersonal Dilemma. *Personality and Social Psychology Review* 15(3): 267–289.

- Ray, K.S. (2016). Not Just “Study Drugs” for the Rich: Stimulants as Moral Tools for Creating Opportunities for Socially Disadvantaged Students. *American Journal of Bioethics* 16(6): 29–38.
- Ryberg, J. (2012). Punishment, Pharmacological Treatment, and Early Release. *International Journal of Applied Philosophy* 26(2): 231–244.
- Shaw, E. (2013). Cognitive Enhancement and Criminal Behavior. In E. Hildt & A.G. Franke (Eds.), *Cognitive Enhancement: An Interdisciplinary Perspective*. Dordrecht: Springer, 265–282.
- Shaw, E. (2014). Direct Brain Interventions and Responsibility Enhancement. *Criminal Law and Philosophy* 8(1): 1–20.
- Shaw, E. (2016). The Right to Bodily Integrity and the Rehabilitation of Offenders Through Medical Interventions: A Reply to Thomas Douglas. *Neuroethics*. doi:10.1007/s12152-016-9277-4.
- Sripada, C., Kessler, D., & Jonides, J. (2014). Methylphenidate Blocks Effort-Induced Depletion of Regulatory Control in Healthy Volunteers. *Psychological Science* 25(6): 1227–1234.
- Stevenson, C. (2016). Self-Pathologizing and the Perception of Necessity: Two Major Risks of Providing Stimulants to Educationally Underprivileged Students. *American Journal of Bioethics* 16(6): 54–56.
- Storebø, O.J., Krogh, H.B., Ramstad, E., Moreira-Maia, C.R., Holmskov, M., Skoog, M., Nilausen, T.D., Magnusson, F.L., Zwi, M., Gillies, D., Rosendal, S., Groth, C., Rasmussen, K.B., Gauci, D., Kirubakaran, R., Forsbøl, B., Simonsen, E., & Gluud, C. (2015). Methylphenidate for attention-deficit/hyperactivity disorder in children and adolescents: Cochrane systematic review with meta-analyses and trial sequential analyses of randomised clinical trials. *BMJ* 351:h5203.
- Tabibnia, G., Monterosso, J.R., Baicy, K., Aron, A.R., Poldrack, R.A., Chakrapani, S., Lee, B., & London, E.D. (2011). Different Forms of Self-Control Share a Neurocognitive Substrate. *Journal of Neuroscience* 31(13): 4805–4810.
- Vincent, N. (2009). Responsibility: Distinguishing Virtue from Capacity. *Polish Journal of Philosophy* 3(1): 111–126.
- Vincent, N. (2010). Madness, Badness, and Neuroimaging-based responsibility assessments. In M. Freeman (Ed.), *Law and Neuroscience, Current Legal Issues (Vol. 13)*, Oxford: Oxford University Press, 79–95.
- Vincent, N. (2014). Restoring Responsibility: Promoting Justice, Therapy and Reform Through Direct Brain Interventions. *Criminal Law and Philosophy* 8(1): 21–42.
- Wikström, P.H., & Treiber, K. (2007). The Role of Self-Control in Crime Causation: Beyond Gottfredson & Hirschi’s General Theory of Crime. *European Journal of Criminology* 4(2): 237–264.
- World Health Organization Regional Office for Europe (2013). *The European Mental Health Action Plan: Regional Committee for Europe Sixty-Third Session*. Copenhagen: World Health Organization Regional Office for Europe.
- Zohny, H. (2015). The Myth of Cognitive Enhancement Drugs. *Neuroethics* 8(3): 257–269.