We thank all three commentators for extremely constructive, insightful, and gracious commentaries. We cannot address all their valuable points. In this response, we elucidate and relate the concepts of addiction, disease, disability, autonomy, and well-being. We examine some of the implications of these relationships in the context of the helpful responses made by our commentators. We begin with the definitions of the relevant concepts which we employ:

- **Addiction (Liberal Concept):** An addiction is a strong appetite.
- **Appetites:** An appetite is a disposition that generates desires that are urgent, oriented toward some rewarding behavior, periodically recurring, often in predictable circumstances, sated temporarily by their fulfillment, and generally provide pleasure.
- **Disease (Naturalistic Concept):** A disease is some biological or psychological state that results in subfunctioning of the organism in a given set of environmental and social circumstances. C. The reference class is a natural class of organisms of uniform functional design; specifically, an age group of a sex of a species. A normal function is a part or process within members of the reference class and is a statistically typical contribution by it to their individual survival and reproduction (Boorse 1977, 1997).
- **Disability (Welfarist Concept):** A disability is a relatively stable biological or psychological state that tends to reduce the amount of well-being that this person will enjoy in a given set of environmental and social circumstances (Savulescu and Kahane 2009; Kahane and Savulescu, 2009).
- **Autonomy (Rationalist Concept):** A person rationally desires or values some state of affairs if and only if he or she desires that state of affairs while (1) being in possession of all relevant, available information, (2) evaluating that information without making relevant, correctable error of logic, and (3) vividly imagining what that state of affairs and its alternatives would be like for him or her (Savulescu 1994). One necessary condition for a desire to be an expression of a person’s autonomy is that it is a rational desire of that person or that it satisfies a rational desire of that person.
- **Well-Being:** A person’s life goes well, or contains well-being, when he or she is engaged in objectively valuable activities (such as developing...
talents, gaining knowledge, achieving worthwhile things, engaging in deep personal relationships, leading an autonomous life, and raising children), which she values (or rationally desires) or which provide pleasure (Parfit 1984, 494).

ON OUR DEFINITION OF ADDICTION

Nordenfelt’s commentary challenges us to define addiction. Perhaps our definition of addiction is hard to see in our paper because it is so simple. It goes like this: Addictions are strong appetites. Addicts are people who have a strong appetite. Appetites generate desires, and the satisfaction of these desires generally provides pleasure. A drug addict has strong appetites for some drug, and, indeed, a person with a strong appetite for Internet use is an Internet addict.

Our definition casts a net around some of the people who the Willpower theorists call addicts, and some of the people who the Disease theorists call addicts. We argue in our paper that disease theorists are wrong about the factual matter of whether drug-oriented appetites are unique in kind. And we argue that Willpower theorists have often been wrong about the real-life capabilities for autonomous action of those who have strong appetites. Some addictions, like addiction to work or to exercise, could be rationally endorsed, valued, or serve rational desires. Nevertheless, we believe we are referring to the same type of things as these two groups of theorists when we use the term ‘appetite’: An acquired strong, urgent, recurrent desire for some rewarding activity.

Our definition is minimal, but it is not quite as minimal as Nordenfelt suggests. It is not enough for an addict to simply ‘regularly seek drugs.’ To regularly take a bath is not to be addicted to taking baths. To be an addict, you need to possess a particular kind of desire: an appetitive desire. It must be urgent, it must be oriented toward some rewarding behavior, it must be periodically recurring, and it must be sated temporarily by its fulfillment. In most cases, satisfaction of an appetitive desire provides pleasure.

When we said “it might turn out that some particular cases of addictive behavior are in fact not autonomous,” we did not mean to suggest that some addicts might have some alien species of motivation that is unlike an appetite. We meant that sufficiently strong appetitive desires might turn out to diminish our autonomy, that is, when they cause us to frustrate our own rational desires. The question of whether strong desires can diminish autonomy in this way is not settled; nevertheless, Nordenfelt asks us to assume that Willpower theorists include an answer to this question in their definition of addiction:

But assume instead that the basic definition made by the Willpower theorist is the following: A drug addict is a person who regularly seeks drugs, takes great pleasure in it, has an extremely strong desire for it and has, partly for this reason, reduced autonomy with regard to the drug-seeking behavior. (2010, XX)

Call this sentence W. W is not only a definition of drug users, it is also an empirical statement about an unrelated relationship, namely, that strong desires can limit autonomy. If this empirical statement were always true (which we deny), it would only serve as a redundant addition to the definition—it would not increase or reduce the number of drug users who were circumscribed by W.

If we eliminate the useless empirical claim in W, and imagine that Willpower theorists define drug addicts using the first three conditions alone, then our definition ensnares that group. Instead of W, their definition would look like this: Drug addicts regularly seek drugs, take great pleasure in them, and have strong desires for them. This definition refers to the same set of people, roughly, as our definition of addiction: That addicts are people with strong appetites. Whether or not these people have reduced autonomy is an open question. It seems conceptually and empirically possible for an addiction to be an expression of autonomy, that is, endorsed rationally or serving some rational desire. Addiction to caffeine is one example.

Matthews also challenges our definition of addiction, characterizing it thus: “genuine addiction, the mark of which, as the authors’ say, is a preference for the addictive behavior over other considerations which would normally be seen as prior” (2010, XX). If we gave the impression that this is how we understand addiction, it was not by
design. Addictions are strong appetites; whether an addict gives preference to the addictive behavior over any other consideration is a thoroughly unrelated concern. Whether or not satiation of that appetite is rational or valued, or detrimental to well-being, or dangerous to survival and reproduction are all open questions. Disease, disability, autonomy, and well-being are all orthogonal to addiction. Addictions can be disabilities, they can reduce well-being and they can compromise one’s autonomy. But they do not necessarily do so. Addiction to nicotine (in the pure form), caffeine, sex, and other addictive patterns can, in their mild forms, have no negative associations. And, on our view, if a ‘chocoholic’ has a strong appetite for chocolate, then she is really addicted to it, whether or not she values this appetite.

ON WHETHER LOST AUTONOMY IS A BINARY STATE

Matthews also charges that we make an ‘either–or’ assumption about addicts: That they are either mindless automata or rational, happy hedonists. Once we make it clear that we define addictions as strong appetites, it should immediately be apparent that the strength of an appetite can lie anywhere on a continuum between utterly weak and extremely strong. On our view, when an addiction is particularly strong, it tends to make us feel conflicted and unhappy because we often choose to frustrate a range of other, weaker desires to satisfy our addictive desires. Stronger appetites also feel ‘harder to resist.’ Nonetheless, when an addict with a peculiarly strong appetite succumbs to temptation, he does so in the pursuit of an appetitive desire, which could be as genuine and as appropriate a source of action as any other appetitive desire.

If strong desires can limit autonomy, then addicts can be more or less autonomous, like anyone else who has a strong desire. But appetitive desires (or any desires) do not go from being appropriate reasons for action to being inappropriate reasons just because they become particularly strong. Many of the best reasons for action involve strong desires—say, the wish to save the life of one’s child. We may feel conflicted or compelled in pursuing such a desire, even when we know it is on balance the best thing to do. We argued that even though a strong desire feels hard to resist, and is hard to resist, this irresistibility tells us nothing reliable about whether a person who ‘gives in’ to such a strong desire is actually executing their will in doing so. There is more than enough reason to doubt that all addicts who claim to be acting against their will are indeed doing so.

Matthews’ phrase “happy hedonists” evokes an implausible extreme case. But how many drug users are, indeed, “happy hedonists”? How many value or rationally endorse their addiction? It is certainly common to conceive of the happy drug user as an aberration or a fiction. But this is a belief that is propped up by various misperceptions. One misperception is that a majority of drug users suffer harms from their drug use that could qualify their lives as imprudent or dysfunctional.

Leave aside the hordes of happy, healthy caffeine addicts, and let us first consider heroin, which is widely considered to be the ‘hardest’ drug. The Substance Abuse and Mental Health Services Administration (SAMHSA) runs a study every year of the drug habits of Americans, called the National Survey on Drug Use and Health. In the 2006 study of 55,279 American adults, 153 said they had used heroin in the past year; of these, 23 (15%) said they had problems with the law owing to heroin during that year, 7 (4.5%) said heroin was causing or worsening physical problems, and 47 (30%) said it was causing a serious problem at home, work, or school. Fourteen (9.2%) said they felt a need for treatment (or additional treatment). Most likely, not all of these 153 users were addicted to heroin, and we can reasonably expect these numbers to be higher among those who have a genuine appetite for heroin.

Other drugs seem to have a much less significant effect on well-being. For comparison, 9,063 had used marijuana in the year preceding SAMHSA’s study, of whom 327 (3.6%) had problems with the law, 265 (2.9%) said that marijuana had caused or worsened a health physical problem, and 660 (7.3%) said that marijuana had caused a serious problem at home, work, or school; 83 (0.9%) said they felt a need for (additional) treatment. These problems no doubt represent serious reductions...
in the well-being of the drug users affected, but it seems as though a majority of current users—perhaps even those who use heroin—do not have serious problems which they attribute to drug use.

Unfortunately, SAMHSA's study does not ask users about the other side of this coin: How much they value their drug use, whether they thought that their various drug-related problems were offset by the benefits of drug use, or whether they were, on balance, happy. Health, legal, or professional problems notwithstanding, a chronic drug user might be happy if she valued drugs strongly enough.

**On a Holistic Theory of Health**

Nordenfelt encourages us to take a more holistic approach to understanding health and illness, including a person's psychological and emotional well-being. In fact, we believe (but cannot argue here) that health and disease are best conceived of in a naturalistic way, with reference to the normal biological functioning of the species, age group, gender, and environment. By contrast, disability (and capability) are best conceived in holistic terms, by reference to well-being, holistically conceived. Diseases need not be disabling, and disabilities need not be diseases.

There is a large debate on the concept of disease, to which Nordenfelt has significantly contributed (Boorse 1997). We cannot address this large debate here save to say that we believe that the holistic concept of well-being is more relevant to the disability than disease (Kahane and Savulescu 2009).

At any rate, most proponents of disease theories of addiction found their theory on a naturalistic conception of disease, like ours. We agree with their understanding of disease, but we deny that addiction is necessarily a disease, at least on current evidence. Addictive appetites may be statistically abnormal mental states, and they sometimes stand in the way of survival or reproduction. But they do not represent any kind of malfunction or reduction in function (we return to Horne's argument on this point below). Strong addictive appetites are often formed through a normal, healthy process of learning in the brain, and for all we know, an addict always acts on her strongest desire. It is just that she desires something which may reduce her survival.

On Nordenfelt's broad view of disease, *any* appetite (of any strength), or indeed any disposition that has a tendency to reduce overall well-being would be a disease, no matter how normal or how irrelevant to one's survival it was. Capriciousness, quick temperedness, and stupidity are diseases on Nordenfelt's holistic view of disease. We think it better to describe these characteristics, along with addiction, as forms of disability (Kahane and Savulescu 2009).

In the spirit of Nordenfelt's critique, it is reasonable to suggest that strong appetites are the direct source of a great deal of suffering in the lives of addicts. Addiction can be very disabling. Perhaps we should seek to have only moderate appetites. On the other hand, a truly holistic account of well-being allows for the possibility that drug-based pleasure could form a component of one's well-being. It is not a disease to value something higher than long life and reproductive success.

We believe that our relationship between disease, disability, and addiction more helpfully explains how we should measure health and how a doctor ought to improve the life of a patient. Insofar as addiction makes a person's life go worse (reduces well-being), that is, constitutes a disability, it should be treated. It is not merely how much addiction reduces chances of survival and reproduction, but rather how badly it makes a person's life go (if it makes it go badly at all) that determines its priority for treatment. People, including addicts, sometimes shorten their lives for various goods in life, giving greater priority to well-being than mere length of life.

**But Does Addiction Cause Ill Health?**

Horne argued in favor of the idea that addictions are diseases in a different way, by arguing that addictive choices are harmful choices in that they are a cause of health dysfunction, where health is interpreted in a naturalistic way, as
species-typical functioning. Although we agree with Horne that a naturalistic definition of disease is correct, his account of disease as species-typical functioning alone is both overbroad and overnarrow. It is too narrow in that, although it may be atypical to hold a very strong appetite, there may be no malfunction in an addict's body. As far as the current scientific evidence is concerned, their reward learning systems are functioning as nature intended—by giving them strong recurrent desires for a pleasurable experience that they repeatedly engaged in.

But Horne's account is also overbroad. Horne claims that “Addiction is a disease because it results in pathology” (2010, XX). Thus, he claims that smoking is itself a disease (and does not merely cause disease). This definition of disease conflates the cause of disease with disease itself. Radiation, lightning, smoking, and smallpox virus can cause disease—but they are not diseases in themselves. It would be absurd to say that the desire to drive one's car at 240 km per hour is a disease, even though it is very likely to cause pathology. A desire for harmful goods is not a disease.

What Horne may have in mind is the concept of psychiatric disease or mental disorder (Savulescu 2009). Schizophrenia and other psychiatric diseases are diseases because they tend to shorten life. And they may do this through generating false beliefs or aberrant desires. Imagine that a schizophrenic believed that he could fly, wanted to fly, and so jumped off a building, killing himself. The delusional beliefs are a part of schizophrenia and they caused him to die. When our belief systems are functioning properly, we do not believe that we can fly by jumping off a building. It is true that addictive desires could cause a person to harm themselves, but addicts are always reasons responsive and addictive desires do not cause addicts to have false beliefs.

Horne's definition of disease, in the terms he gives it, defines the desire to climb Mount Everest without oxygen or drive one's car very fast as diseases. In our paper, as Matthews correctly identifies, addiction does not necessarily involve pathology and is “just a particular example of normal human pleasure seeking” (2010, XX). Perhaps we should have qualified this to say that it is often or usually just a particular example of pleasure seeking. But what is important is that pathology is not central to addiction. It may or may not be present. Of course, it is possible that we will one day identify biological changes in the brains of some addicts that cause their appetites to function differently than normal. Whether there are such biological changes in addiction, as there probably are in schizophrenia, remains an open question, although none have been discovered so far. If there were such changes, and the resulting appetites did reduce survival, then addiction would itself be a disease. It would be different to a desire to drive very fast to test out a new Maserati or to go skydiving.

Whether addiction is a disease itself is not our primary concern. It is clear that, even if it could be a disease, in many cases it would be a very mild disease or no disease at all (as in the case of caffeine addiction), as Horne acknowledges. And, as Horne notes, there is a continuum from perfect health to severe disease.

We agree that some addictions might turn out to be diseases in the light of new, unforeseen empirical evidence. Addictions can certainly cause disease. But what matters is not whether addiction is a disease, but the degree to which it is a disability.

The important problem with the Disease View of addiction is not that it calls addiction a disease. It is that it falsely makes out addiction to be the result of an abnormal and unique biological process, rendering the desires and choices of the addict automatically inauthentic or invalid.

**On the View That Addiction Is a Frontal Lobe Dysfunction**

We have argued that addictions do not, as far as we know, impair the functioning of a brain in a way that regular appetites do not. Horne argues, to the contrary, that addiction involves a dysfunction of frontal lobe circuits that normally allow us to learn behavior so that it becomes automated, freeing up cognitive space for other tasks.

These circuits produce automated behaviors, such as compulsive and obsessive traits. Without them children would not be cared for and most of us would not go to work. They lead to attention to detail and the fol-
lowing of routine that makes us get up and go to work every day. These normal and important behaviors are the product of “learning” in the frontal lobes of normal people. (2010, XX)

On the other hand (and in a similar manner to the production of tics and guild dystonia in motor circuits) over activity in these circuits causes disabling compulsions and obsessions instead of the normal constructive and useful compulsions. Addiction is, in effect, a compulsion produced by these circuits. (2010, XX).

There is a problem with this view: It matches some cases of drug seeking, but hardly all of them. A heroin user, once wealthy enough to buy drugs in a clandestine, safe manner, finally runs out of both money and heroin. She is not any less addicted than before, but she must devise new methods to obtain the heroin. This is not a habitual process; it is not muscle memory. It is not even much like a person with an impulse control disorder, who might overindulge if a bowl of peanuts is left too close to hand. Rather, it is goal-directed problem solving. The heroin user’s problem, if she has one, is not that she has frontal damage (although she may). Her problem is that she has a strong, recurrent, appetitive desire for heroin.

In any case, to agree with Horne’s view that addiction is ‘failed impulse control,’ we would have to agree that all addicts wish to control their addictive impulses. Given that we know that some addicts can control their addictive impulses, and given that there is no way to know whether or not they want to control them, there is no valid rationale for assuming that anything has ‘failed’ when addicts use drugs. In some cases, people value their addictions. Thus, it cannot be that addiction is necessarily failed impulse control. It is not true that all addictive behavior, however compulsive it may be, is necessarily unwanted or dysfunctional.

ON THE DIFFERENCES BETWEEN INDIVIDUAL DRUGS

As Matthews suggests, it is true that we give little attention to reasons for taking drugs other than the pursuit of pleasure. Clearly, there are a number of factors that modulate the addictiveness of a substance other than the amount of reward elicited. The ‘nicotine bolus hypothesis,’ for example, suggests that cigarettes are peculiarly addictive because each cigarette consists of a number of separate doses of nicotine (Russell and Feyerabend 1978). Tobacco companies are also known to have included herbs in their cigarette recipe to make the smell more complex, because complex stimuli are thought to generate a more lasting effect on the brain (Megerdichian et al. 2007). And drugs like alcohol, which are always available and which we are frequently under social pressure to consume, are more likely to be consumed frequently enough to cause an appetite to be formed. It is certainly not the case that the most pleasurable or rewarding drugs are the most addictive.

It is also true that there is a range of reasons for initiating the use of drugs, before one is addicted. Some drugs alter some characteristic in a way which is desirable but not pleasurable: For example, alcohol increases sociability and dextroamphetamine enhances attention. Some drugs, such as heroin or gamma-hydroxybutyric acid, are often sought for their ability to induce oblivion, more so than their ability to induce pleasure. Matthews may be correct in saying that this is ‘the attraction’ of drugs, but more likely it is one attraction among many. Regardless of why different people seek drugs, one thing unites them: If they take a drug enough times, they develop an appetite for that drug. It may remain true that they wish to obtain oblivion or an altered state of consciousness through drug use, but they also begin to want the drug for its own sake.

We must be careful not to think of ‘reward’ as conceptually identical with pleasure. One is a pattern of brain activation which leads to the generation of appetites, or ‘wanting.’ The other is a felt sense of enjoyment, or ‘liking.’ A number of neurobiological experiments have shown conclusively that ‘wanting’ and ‘liking’ most frequently occur together, but may be forced to occur separately (Robinson and Berridge 2000; Robinson et al. 2005).

CONCLUSION

Diseases are biological or psychological states that reduce species-typical functioning so that
survival and reproduction are diminished in a given natural and social environment. Disability is any biological or psychological state which reduces well-being in a given natural and social environment.

Addiction is a strong appetite. Current evidence does not support the claim that addictions are diseases, although some future evidence may reveal that some addictions are diseases, involving unique biological changes in (for example) the frontal lobes, resulting in failed impulse control and a compulsion to take a drug. If this were true, addiction to a drug like heroin would be a disease because it would tend to shorten the addict’s life. However, some addictions do not shorten life or limit reproduction and can never be diseases, like addiction to caffeine or work. For this reason, the Disease Model of addiction is false or at best incomplete.

Some addictions tend to be disabilities, like addiction to gambling. Others tend not to be disabilities, like addictions to caffeine. Some addictions might compromise autonomy, where a person truly does not value or rationally endorse the satisfaction of appetite, although we cannot know this for certain in any individual case. Other addictions may be an expression of autonomy—like obsessive work or attention to detail. For this reason the Willpower model is false or incomplete.

What matters is not whether addiction is a disease, but the degree to which it is a disability. Well-being is increased when we live longer and act autonomously. Measuring the degree to which addiction is a disability captures what is normatively important about both the Disease and Willpower models.

But on a Liberal Account of addiction as appetite, drug and other addicts may be substantially autonomous and lead good lives. Nothing of normative significance necessarily follows from being an addict. In any given natural and social circumstance, we must examine whether a specific addict or addiction is associated with compromised autonomy, reduced survival (disease), and reduced well-being (disability). What ultimately matters is the degree to which addiction is a disability. In some cases, addiction enhances a person’s life, such as mild addiction to exercise. Where it prolongs life, it is not a disease, but rather its opposite.

Drug addiction is no different in kind to other addictions. To understand how bad a drug addiction is, we must ask how great a disability it is.

Little useful work is done by labeling someone as an addict. The normative work is done when we ask: Does this addiction shorten the addict’s life? And, more important, does this addiction make her life go worse? In some cases it will, and she therefore is a candidate for treatment if she wants it. In some cases, it will not, in which case, it is not a candidate for medical treatment or even medical interest. It is also normatively important to ask whether an addiction compromises a given addict’s autonomy, but as we have argued, nobody can answer this question on her behalf.

Addictions are appetites. Appetitive desires play an important part in our lives. They can be diseases, shortening lives. They can make a person’s life go worse in an objective sense. Perhaps they can compromise autonomy. But not always. A Liberal Account of addiction places these appetitive desires within a whole life, acknowledging their significance, and recognizing they can be good or bad, depending on the circumstances. Addiction is neither necessarily a disease nor a loss of willpower. It is just a strong appetite for a rewarding behavior that, very often, provides the addict with pleasure.

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