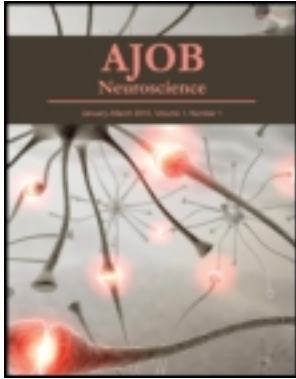


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The Purpose in Chronic Addiction

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Target Article

The Purpose in Chronic Addiction

Hanna Pickard, Oxford Centre for Neuroethics, University of Oxford, and Oxford Health NHS Foundation Trust

I argue that addiction is not a chronic, relapsing, neurobiological disease characterized by compulsive use of drugs or alcohol. Large-scale national survey data demonstrate that rates of substance dependence peak in adolescence and early adulthood and then decline steeply; addicts tend to “mature out” in their late twenties or early thirties. The exceptions are addicts who suffer from additional psychiatric disorders. I hypothesize that this difference in patterns of use and relapse between the general and psychiatric populations can be explained by *the purpose* served by drugs and alcohol for patients. Drugs and alcohol alleviate the severe psychological distress typically experienced by patients with comorbid psychiatric disorders and associated problems. On this hypothesis, consumption is a chosen means to ends that are rational to desire: Use is not compulsive. The upshot of this explanation is that the orthodox view of addiction as a chronic, relapsing neurobiological disease is misguided. I delineate five folk psychological factors that together explain addiction as purposive action: strong and habitual desire; willpower; motivation; functional role; and decision and resolve. I conclude by drawing lessons for research and effective treatment.

Keywords: action, addiction, compulsion, disease, folk psychology, psychiatry, treatment

Addiction is widely viewed as a chronic, relapsing, neurobiological disease characterized by compulsive use of drugs or alcohol (National Institute on Drug Abuse 2009; World Health Organization 2004). The *Diagnostic and Statistical Manual (DSM) IV-TR* describes substance dependence as a maladaptive pattern of chronic, relapsing use (American Psychiatric Association [APA] 2000, 206), which is diagnosed by a polythetic set of criteria that include tolerance, withdrawal, and compulsive drug-taking behavior in the face of negative consequences (APA 2000, 192–198). Although the *DSM IV-TR* employs the language of disorder rather than disease, the emphasis on the chronic, relapsing course of addiction, the neuroadaptations expressed by tolerance and withdrawal, and the compulsive element is nonetheless clear in the description of the condition and the diagnostic criteria. And, of course, various pockets of popular culture, including those influenced by Alcoholics Anonymous (AA) and related treatment programs, equally adhere to a disease model of addiction.¹ In a common metaphor adopted by many, the brain of those who suffer from addiction has been “hijacked” by the drug, compelling use by overriding the capacity for voluntary choice or control in relation to consumption (Charland 2002; Hyman 2005; Leshner 1997).

This view of addiction is challenged by large-scale national survey data (for a comprehensive review of these findings, see Heyman 2009; cf. Foddy and Savulescu 2006; Peele 1985). Data from the Epidemiologic Catchment

Area Study 1980–1984, the National Co-Morbidity Survey 1990–1992 and 2001–2002, and the National Institute on Alcohol Abuse and Alcoholism demonstrate that addiction, as defined by the *DSM-IV* criteria for substance dependence, peaks in adolescence and early adulthood, but, in the majority of cases, has resolved permanently, without clinical intervention, by the late twenties or early thirties (Anthony and Heltzer 1991; Compton et al. 2007; Kessler et al. 2005a; 2005b; Stinson et al. 2005; Warner et al. 1995).² Addicts tend to “mature out” as the responsibilities and opportunities that characterize adult life increase.

The exceptions to this finding are addicts who suffer from additional psychiatric disorders. Chronic, relapsing addiction is associated with psychiatric comorbidity, especially concurrent diagnoses of mood, generalized anxiety, and personality disorders (Compton et al. 2007), as well as long-standing use of psychiatric services (Regier et al. 1990). This potentially explains the otherwise puzzling finding that, out of the many Vietnam veterans who returned to the United States addicted to opiates, the few who received psychiatric treatment were five times *more* likely to relapse than the many who stopped using opiates spontaneously (Robins 1993; cf. Heyman 2009). Reflecting on these large-scale survey data, it is natural to speculate that the relapsing veterans suffered from additional psychiatric disorders that complicated their addiction. This may explain why, unlike their cohort, they both struggled to control their use upon their return, and were engaged with psychiatric services.

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1. For a critical discussion of this aspect of AA from an addict’s perspective, see Flanagan (forthcoming).

2. These findings cohere with the longitudinal study of male drinking patterns in Vaillant (1995).

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But, speculation aside, the large-scale national survey data do not suggest that, for the general population, addiction is correctly characterized as a chronic, relapsing condition of any sort, never mind a chronic, relapsing, neurobiological disease. On the whole, addiction is only a chronic, relapsing condition *for psychiatric patients*.

This difference in patterns of use and relapse between the general and psychiatric populations demands explanation. This article offers an explanation: I hypothesize that the key to understanding why psychiatric patients do not “mature out” of addiction at the same rate as the normal population lies in *the purpose* served by drugs and alcohol for these patients, together with the nature of their lives. The use of drugs and alcohol can provide a habitual and, in the short-term, effective way of managing the severe psychological distress typically experienced by patients with comorbid psychiatric disorders and associated economic, social, and relationship problems. This is a staple of much clinical understanding of addiction, often referred to as the self-medication hypothesis (e.g., Khantzian 1985; 1997). Put crudely, drugs and alcohol offer a way of coping with intense negative emotions (such as those associated with mood, anxiety, and personality disorders) and other psychiatric symptoms. Hence, unless recovery from comorbid disorders is achieved or symptoms are adequately managed, better life opportunities are available, and alternative ways of coping with psychological distress are learned, patients are unlikely to forgo the use of drugs and alcohol as a way of managing their intense negative emotions and other symptoms.

The upshot of this explanation is that the orthodox view of addiction as a chronic, relapsing, neurobiological disease is misguided. Addiction is not chronic and relapsing for the majority of the general population. Moreover, for the psychiatric population, for whom addiction may be chronic and relapsing, it is not a neurobiological disease characterized by compulsive use. These addicts use drugs and alcohol purposively: to alleviate severe psychological distress. Consumption is a chosen means to desired ends. If the ends are no longer as pressing, or alternative ways of achieving them are available, it is possible to choose differently: Use is not compulsive. As elaborated in what follows, treatment for addiction within the psychiatric population is thus unlikely to be effective if a disease model is maintained. Instead, effective treatment must address the comorbid condition and source of psychological distress, offer help and support with associated economic, social, and relationship problems, and teach alternative ways of coping with intense negative emotions.

This article has three parts. First, I argue that, contra many neurobiological and philosophical accounts of addiction, it is not a form of compulsion: Addictive desires are not irresistible. Second, I delineate five rough-and-ready folk psychological factors that I suggest together can explain chronic, relapsing drug-seeking and drug-taking behavior as purposive action. These factors are strong and habitual desire; willpower; motivation; functional role; and decision and resolve. Finally, I draw a series of lessons from this discussion, for both our understanding of the nature of ad-

diction, and how it can be effectively treated by psychiatric services and better addressed in wider society.

ADDICTION IS NOT COMPULSION

There is no clearly agreed definition of compulsion. But it is standardly understood to mean an urge, impulse, or desire that is irresistible: so strong that it is *impossible* for it not to lead to action. The compelled person has no power to do otherwise: No alternative course of action is available. This conception of addictive desire as compulsive is naturally linked to neurobiological explanations of behavior (cf. Berridge and Robinson 2011; Hyman 2005). For example, Louis Charland suggests that “the compulsive drug-taking that defines [heroin] addiction is a direct physiological consequence of dramatic neuroadaptations produced in the reward pathways of the brain” (Charland 2002, 40–41). For this reason, according to Charland, “decisions that relate to heroin use are susceptible to powerful physiological and psychological compulsions that usually *nullify any semblance of voluntary choice*” (Charland 2002, 41, my emphasis).³ Similarly, Alan Leshner suggests that “continued repetition of voluntary drug taking begins to change into involuntary drug taking, ultimately to the point that the behaviour is driven by a compulsive craving for the drug” (Leshner 1997, 45).⁴ Finally, to take an example from analytic philosophy rather than bioethics or addiction research, Harry Frankfurt famously describes addiction as a “physiological condition” that means a person “inevitably succumbs” to the desire to use, which is “too powerful . . . to withstand” and results in that person potentially being “helplessly violated by [that person’s] own desires” (2003 [1971], 328).

3. Note that Charland’s ultimate target in the quoted paper is the claim that heroin addicts have sufficient decision-making capacity to consent to treatment. Charland’s argument for this claim has two strands. The first strand argues directly from the fact that addicts “can’t say no” to heroin and so, according to Charland, have no voluntary choice over consumption: The irresistible compulsion to use impairs their decision-making capacity about heroin (2002, 37 ff.). The second strand argues that long-term patterns of abstinence and relapse demonstrate that heroin addicts lack a sufficiently stable set of values and preferences with respect to heroin over time for their decisions at any one time to manifest sufficient decision-making capacity for consent to treatment (Charland 2002, 41 ff.); Charland develops this second strand of argument and relates instability of values and preferences to what he calls “pathological affect” in recent work (Charland 2011). I believe there are good reasons to reject this second strand of argument. But it is important to be clear that, unlike the first strand, it does not depend on Charland’s claim that addicts “can’t say no” to heroin. This leaves open the possibility that Charland could abandon his claim that addiction is a form of irresistible compulsion while yet pursuing his target claim that addicts do not have sufficient decision-making capacity to consent to treatment.

4. Note that although Leshner’s claim about the effect of addiction on choice is equally as strong as Charland’s, he nonetheless emphasizes the importance of embedding a disease model of addiction within a wider context, where multiple factors, including genetics and social environment, contribute to the development and maintenance of the disease.

This picture of addiction as rendering a person quite literally powerless over the causal force exerted by drugs on their brain is shared by many who adhere to the view that addiction is a chronic, relapsing, neurobiological disease characterized by compulsive use of drugs or alcohol. The neuroadaptations associated with addiction are supposed directly to cause consumptive behavior, bypassing the capacity for choice and control, and eliminating an addict's agency. Note that this picture is entirely consistent with the equally prevalent and evidently correct view that the capacity for choice and control comes in degrees, and, moreover, that addiction is typically a gradual process of ever diminishing control.⁵ Nevertheless, at rock bottom, as we say, when the addiction is well established and severe, the view that addiction is a form of compulsion standardly maintains that control has bottomed out at zero. There is literally *none left*, according to the descriptions offered by the theorists quoted earlier: There is no semblance of voluntary choice, no possibility of doing otherwise. As Carl Elliott expresses this claim, an addict "must go where her addiction leads her, because the addiction holds the leash" (Elliott 2002, 48, quoted in Levy 2011a).

It is important to be clear that there is no question that immoderate long-term drug use can affect neural mechanisms. Many drugs directly increase levels of synaptic dopamine, which may affect normal processes of associationist learning related to survival and the pursuit of rewards (for a review see Hyman 2005). Once drug-related pathways are thus established, cues associated with drug use cause addicts to be motivated to pursue the reward of drugs to an unusually strong extent. Moreover, there is increasing evidence that as drug use escalates, control devolves from the prefrontal cortex to the striatum, in line with a shift from action-outcome to stimulus-response learning (for a review see Everitt and Robbins 2005). In rats, drug use that is initially goal-directed and sensitive to devaluation of outcome becomes increasingly habitual: triggered automatically and insensitive to (mild) devaluation.

However, these neurobiological data do not establish that addiction is a form of compulsion and that control is nil. From a philosophical perspective, we should immediately be skeptical of any such conclusion on conceptual grounds. We commonly hold that what makes a piece of behavior an action, as opposed to a mere bodily movement, like an automatic reflex, is that it is voluntary. This means that there is the capacity for genuine choice between courses of action. Minimally, there must be at least two choices: to act in a particular way at a particular time, or not to.⁶ There

5. For a good example of research that emphasizes the graded nature of control in addiction, see the articles collected in *Addiction and Responsibility* (2011) edited by Jeffrey Poland and George Graham. See also Pickard and Pearce (forthcoming) and Sinnott-Armstrong and Pickard (forthcoming).

6. Steward (2009) defends this concept of action and argues that it is found throughout the history of philosophical writing on action and free will, for example, in Aristotle (1984), Hobbes (1999), Hume (1975), Reid (1994), and Kant (1960). See too Williams (1995) and Alvarez (2009) for detailed exposition and defence of the claim.

is thus a dilemma facing the claim that addictive desire is genuinely irresistible. Drug-seeking and drug-taking behavior appears to be deliberate, to be flexible, and to involve complicated diachronic planning and execution. It bears all the hallmarks of action. But for it to be action as opposed to merely automatic reflex, alternatives must be available; minimally, it must be possible to refrain. Hence either addictive desires are resistible and the power to do otherwise remains or, despite appearances, the behavior they cause is not action (cf. Alvarez 2009).

Note, importantly, that it is perfectly possible to hold that addictive desires are resistible but that people suffering from addiction may yet be excused from blame for acting on them. For example, if drugs are indeed used to manage severe psychological distress, then, in absence of alternative coping mechanisms, addicted individuals may be *justified* in choosing to take drugs, with the crucial caveat that such justification depends on the nature and degree of any harm caused to others by their doing so. In essence, addiction may be excused not as a form of compulsion, but as a form of duress.⁷

From a more empirically informed perspective, there are four reasons to be skeptical of the claim that addiction is a form of compulsion. First, although neurobiology may explain how cues associated with any substance that directly increases levels of synaptic dopamine strongly motivate behavior, it remains unclear why these mechanisms would be sufficient to render desires for drugs different in kind, and not simply in strength, from more ordinary appetitive or reward-driven desires which we do not regard as irresistible. Neurobiology may explain why addictive desires are very strong and hard to resist, but it does not thereby explain why they should be *impossible* to resist. Second, although increasing striatal control and insensitivity to (mild) devaluation of outcome does show that the behavior has become more automatic and habitual, it does not show that control is fully lost. Automatic, learned habits not only can be deliberately altered over time, but can be resisted in the moment when motivation is sufficiently strong. Moreover, human motivation is typically complicated and sensitive to more than devaluation of immediate outcome; the lessons from experiments with rats do not clearly apply. Third, it is usually open to those suffering from addiction, unlike experimental rats, to avoid drug-associated cues and stimuli. This is a standard intervention in most effective treatments for addiction, and it is well known by addicts themselves: Identify triggers and avoid them (Petersen and McBride 2002). For example, alcoholics know that if they are genuinely trying to abstain, it is much better not to go to the pub in the first place: Don't court temptation. Of course, this may not be easy advice to take, as the costs may be high, and include loss of friendship and social community. The point is that this knowledge is typically available to addicts and it is possible to act on it should they choose.

7. For an important discussion of this possibility, see Yaffe (2011); for an objection to the details although not the spirit of Yaffe's account, see Pickard (2011).

Fourth and most importantly, as discussed earlier, large-scale national survey data establish that addicts “mature out” of use: The majority of addiction resolves itself without clinical intervention by the late twenties or early thirties. Moreover, research equally suggests that many addicted individuals will abstain from using over prolonged periods of time when offered immediate but modest monetary incentives (Higgins et al. 1991; 1994; 1995). This finding has led to the development of various forms of contingency management treatment for addiction. Such treatment is very simple: Vouchers, money, or small prizes are given to patients who produce clean urine samples. Typically, patients submit urine thrice weekly, with increasing value for each clean sample. The samples are tested and the reward is offered immediately. Contingency management treatment radically reduces risk of disengagement from treatment and radically increases periods of abstinence compared to other standard treatments, such as counselling and behavioral therapy (for a review, see Petry, Alessi, and Rash 2011). If addictive desires are irresistible, and drug-taking and drug-seeking behavior is a direct consequence of a neurobiological disease, then spontaneous recovery and motivated abstinence should be surprising and rare. Yet both are not only possible but common. The most obvious explanation is that addicts choose to abstain when they are sufficiently motivated to do so: They are not compelled to use.

Philosophers often suggest that spontaneous recovery and motivated abstinence fail to establish that addicts are not compelled to use. The reason offered is that the capacity for control must be relativized to a motivational and epistemic context (cf. Mele 1990). Otherwise, as Neil Levy puts it, “We get the absurdity that, say, agoraphobics are not compelled to remain indoors, since, given the appropriate incentives [e.g. the house is on fire], they would leave” (2011a, 271). Applying this lesson to addiction, the claim is that the fact that addicts refrain from use in particular circumstances (e.g., when offered immediate but modest monetary incentives, or when they secure a good job, or become parents) does not show that they have control over their use outside of these circumstances; all it shows is that they have control in these circumstances (cf. Levy 2011a). Control must always be relativized to circumstance.

We should agree that extreme circumstances affect people’s capacities. In order to save a child from death, a parent may have the capacity to move a crushing weight even though in standard conditions the person lacks the requisite physical strength. After withstanding harrowing physical torture, a prisoner may lose the capacity to further resist the demand for information. Extreme circumstances no doubt affect what people can and cannot do. But this point should not bar us from holding that, in less extreme circumstances, behavioral change following motivational change provides strong evidence of a general capacity for behavioral control.

Consider, for instance, a man who “sees red” and routinely resorts to physical violence in drunken disputes—except when in view of a policeman. On such occasions, he is highly motivated not to hit, which he would otherwise do, out of fear of being detained and charged with

common assault. Does his restraint in this context show only that he can control his aggression when in view of a policeman, but not necessarily otherwise? This is not our natural understanding of this man’s behavior. The more natural understanding is that it shows that the man has a general capacity to control his aggression, but that he only exercises it when he wants to. There is a basic, commonsense distinction between what a person can do but won’t (because the person doesn’t want to) as opposed to what a person wants to do but can’t (because the person lacks the capacity). We must recognize extremes, but relativizing control too strongly to motivational and epistemic circumstances threatens the cogency of this distinction.

With respect to addiction, modest monetary incentives and the ordinary aspects of adult life that motivate “maturing out” (such as employment opportunities and parenthood) are not extreme circumstances. They are standard, commonplace reasons for abstaining. They thus provide strong evidence that addicts have the general capacity to control their use, in a broad range of ordinary conditions, despite the neurobiological effects of drug use. Indeed, this point is found even in Edwards and Gross’s seminal discussion of the disease model of alcohol dependence. They write that “it is unclear, however, whether the experience [of alcoholism] is truly one of losing control rather than one of deciding not to exercise control” (Edwards and Gross 1976, 1060). Of course, addicts will only refrain from use if they want to. In the next section, I suggest why there may be compelling reasons why they often don’t. But the link between motivation and abstinence should not cause us to hold that, unless motivated, addicts can’t refrain from drug use—any more than we should hold that aggressive men cannot refrain from hitting, and agoraphobics cannot leave the house.⁸

Note, for clarity, that the claim that there is strong evidence that addicts have the general capacity to control their use in a broad range of ordinary circumstances says no more than that. The evidence is strong, but I do claim that there are no possible reasons for doubt. The capacity is general, but that is consistent with the possibility of particular circumstances in the lives of particular individuals when it cannot be exercised. The point is rather that our best general theory of addiction should reflect the strength of this evidence: Addicts do not on the whole appear to be compelled to use. We should therefore proceed on the basis of this

8. Note that, contra Levy, from a clinical perspective there is no absurdity in the claim that an agoraphobic can leave the house. Effective treatment for agoraphobia is likely to include a form of exposure therapy that involves nothing other than the patient leaving the house, with increasing duration and regularity, and decreasing support from the therapist. Repeated exposure to anxiety-provoking stimuli reduces anxiety. The more you do it, the easier it gets, but you have to do it for exposure therapy to work. The clinical presumption in exposure therapy is that agoraphobics can leave the house, however much they desire not to. This of course is perfectly compatible with clinical recognition of the degree of the agoraphobic’s anxiety, and the consequent difficulty for them in facing it.

evidence unless we find equally strong reason not to; and, if there are exceptions, they need to be established case-by-case.

Finally, we might wonder how the testimony of addicts themselves relates to this evidence. Charland famously reports a conversation with a heroin addict named Cynthia, who treats the idea that heroin addicts have the capacity to consent to heroin prescription with utter disbelief: "If you're addicted to heroin, then by definition you can't say 'No' to the stuff" (Charland 2002, 37). Cynthia is not exceptional: Especially when initially engaging with psychiatric services, it is not unusual for patients to say they "can't" control their drug taking and other impulsive behavior. But there are many reasons to query such testimony.

First, not all addicts agree: For every story of compulsive use, there is a story of deliberate abstinence, empowerment, and recovery (cf. the first-person narratives in Heyman 2009).⁹ Second, and relatedly, testimony may be affected by the wider social and economic function it serves. On the one hand, some addicts may have reason to claim that they are compelled, because this can potentially excuse them from blame for drug-related behaviors, or justify the need for social or financial aid. On the other hand, some addicts may have reason to claim they are not compelled, because of the potential for disempowerment, loss of hope, and rejection from addiction communities, or family and social groups, that emphasize personal responsibility and agency. Addicts may be conscious of these motivations, but equally they may not be and yet their testimony is affected. Quite generally, our understanding and experience of ourselves is not theory-neutral. It can be affected by our beliefs, which, in turn, can be affected by the wider social and economic context in which we live. Lastly, "can't" can have multiple meanings (cf. Sinnott-Armstrong and Pickard forthcoming). When we say that we cannot do something, we often mean that the costs of doing it are high, or that the reasons for not doing it are compelling. This may be what addicts mean by "can't." They may not be saying that it is impossible to refrain from use: that the desire to consume is irresistible. Rather, they may be expressing how hard it is to choose to refrain because of the costs of abstinence, and the many good reasons they have to continue to use (see later discussion).

For these reasons, testimony is a complicated form of evidence for research on addiction. But it is extremely important for other reasons. Testimony helps us understand what it is like to live with addiction, at least for the particular addict telling the story. From a psychiatric perspective, personal history is unquestionably relevant to providing the best care and treatment: Treatment is likely to be most effective if tailored for the individual, never mind the therapeutic benefit to patients of simply having their voices heard. From a broader, societal perspective, the understanding available through listening to addicts' stories may help to promote

9. For a balanced, reflective account of a personal struggle with addiction that is broadly in keeping with the theory and evidence presented here, see Flanagan (2011; forthcoming).

empathy and compassion, thereby combating the stigma and stereotypes that can attach to addiction.

FIVE FOLK PSYCHOLOGICAL FACTORS EXPLAIN CHRONIC ADDICTION

Conceiving of addiction as a neurobiological disease characterized by compulsive use can blind us to a nuanced understanding of the psychological reasons why addicts use drugs and alcohol, and, consequently, why they struggle to abstain. I suggest that five rough-and-ready folk psychological factors can explain chronic addiction.¹⁰ Neurobiology sheds light on the mechanisms underpinning these folk psychological factors (see earlier description). Genetic factors predispose individuals to addiction (e.g., Enoch and Goldman 2001; Merikangas et al. 1998; Prescott and Kendler 1999). And environmental factors help to explain when and why addiction develops both in individuals who are and those who are not genetically predisposed (see later discussion). But folk psychology provides the basic structure for the explanation of addiction, whether the addiction is chronic or short-lived.

Factor One: Strong and Habitual Desire

There is no question that, for all addicts, the desire to use their drug of choice is strong and habitual. As suggested earlier, we are starting to understand some of the neurobiological mechanisms underpinning the formation of desires and the establishment of strong stimulus-response associations between cues and behavior. But even without this understanding, common sense tells us that strong habits are hard to break. When desire is strong and one is in the habit of satisfying it, it is not easy to resist.

Factor Two: Willpower

Resisting a strong desire requires a conscious effort at control: It requires will. There is increasing empirical evidence for what we might metaphorically construe as a faculty of willpower that acts much as a muscle does. It is effortful to exercise, and its exercise depletes its strength in the short-term, but can increase it in the long-term (for a review see Muraven and Baumeister 2000). Self-control, especially in relation to strong habits, requires this faculty: with respect to addictive desires, conscious and sustained effort to resist the pull of the drug (cf. Levy 2011a; 2011b). Further, according to Neil Levy, conscious and sustained effort that depletes willpower resources may cause "judgement shifts," whereby addicts reassess the value of abstinence and abandon prior resolutions in face of the present value of use.¹¹

10. "Rough-and-ready" signals that there is no commitment to these factors carving human psychology at its joints. They may not prove to be the most accurate classification of folk psychological states; rather, they represent a natural and pragmatic grouping of the kinds of considerations relevant to a psychological understanding of addiction.

11. For development of this view in relation to questions of responsibility within addiction, see Levy (2011b).

Factor Three: Motivation

Addiction is associated not only with comorbid psychiatric conditions, but also with lower socio-economic status (Compton et al. 2007; for a review of the data see Heyman 2009), and, of course, the problems attendant upon the acquisition and use of the drug itself. The life choices and alternatives available to addicts are typically meagre: Even if they succeed in abstaining, they will still need to pick up the pieces and squarely face some of the worst of life's various miseries. Bruce Alexander's infamous experiment "Rat Park" is instructive in this light (Alexander, Coombs, and Hadaway 1978; Alexander et al. 1985). Caged, isolated rats addicted to cocaine, morphine, heroin, and other drugs will self-administer in very high doses, foregoing food and water, sometimes to the point of death (Woods 1978). Alexander placed morphine-addicted rats in an enclosure called "Rat Park," which was a spacious, comfortable, naturalistic setting, where rats of both sexes were able to cohabit, nest, and reproduce. Rats were offered a choice between morphine-laced water and plain water. On the whole, they chose to forego the morphine and drink plain water, even when they experienced withdrawal symptoms, and even when the morphine-laced water was sweetened to significantly appeal to the rat palate. Recent studies complement Alexander's findings. Environmental enrichments protect against relapse in rats (Solinas et al. 2008).

Addicts who abstain from use are not typically offered the immediate option of a human version of "Rat Park." The good life does not spring forth ready-made; help with housing, employment, psychiatric problems, and social community does not tend to be promptly available. The opportunities and choices available to many addicts may reasonably impede their motivation to control their use, for the alternative goods on offer are poor.

Factor Four: Functional Role

Among other functions, drugs and alcohol can help manage psychological distress (for a review of the multiple functions of nonaddictive drug use see Muller and Schumann 2011). This is common knowledge in our culture: We "reach for the bottle" or "drown our sorrows" when in need. Within the general population, research demonstrates that alcohol, barbiturates, benzodiazepines (and other sedative anxiolytics), and especially cannabis are self-administered to cope with stress (Bonn-Miller, Zvolensky, and Bernstein 2007; Boyd et al. 2009; Boys et al. 1999; Boys, Marsden, and Strang 2001; Cooper, Russell, and George 1988; Kuntsche et al. 2005; Perkins 1999). Within the psychiatric population, there is evidence of increased consumption of alcohol, cannabis, benzodiazepines (and other sedative anxiolytics), nicotine, and opioids (Hughes et al. 1986; Jacobsen, Southwick, and Kosten 2001; Khantzian 1985; 1997; Markou, Kosten, and Koob 1988). The self-medication hypothesis has long been a staple of clinical understanding of psychiatric patients' use of drugs and alcohol (e.g., Khantzian 1985; 1997; for a review of how the neurobiological effects of drugs and alcohol may alleviate psychiatric distress and symptoms, see Muller and

Schumann 2011). Psychiatric patients use drugs and alcohol to gain relief from psychological distress caused by intense negative emotions and other psychiatric symptoms.

Insofar as underlying causes involve comorbid psychiatric disorders, the consequent distress will persist until the addict has recovered from the comorbid disorder, or, alternatively, is treated with an effective form of symptom management. In the meantime, new ways of coping and skills for living will need at first to be learned deliberately and laboriously.¹² No doubt, with time, they can become easier and more habitual, requiring less conscious effort and will to implement. But until the underlying causes have been addressed, and new ways of coping with negative emotions and skills for living have been learned, the cost of abstinence is likely to be very high.

Factor Five: Decision and Resolve

Controlling use typically requires not just willpower, but perseverance and resolve. Addicts must overcome any natural ambivalence they might feel about whether or not to stop using. They must decide to change, and they must form a resolution to stick with that decision in the face of future temptation. This is a substantial undertaking for many addicts. But, importantly, addicts cannot even make such a decision if they genuinely believe that they are powerless over their desire to use: that their behavior is the effect of a neurobiological disease. For one cannot rationally form an intention or make a decision to do something if one believes that one cannot succeed: that it is simply not in one's power to do so.¹³ In this respect, the characterization of addiction as a neurobiological disease impedes recovery, for it is an obstacle to the rational formation of resolutions or decisions to abstain.

The Explanation

All addicts, by definition, have a strong desire to use their drug of choice, which they are in the habit of fulfilling. Restraint is thus hard; it requires willpower. Most addicts "mature out" during their late twenties and early thirties. Once the view that addiction is a form of compulsion has been rejected, the natural explanation is that they are motivated by the responsibilities and opportunities that characterize adult life to exercise the willpower necessary to abstain. Those addicts who do not "mature out" typically suffer from additional psychiatric disorders, and are regular users of psychiatric services. For these patients, substance use is likely to serve a particular purpose: It provides a habitual and, in the short term, effective way of managing the

12. For further discussion of this point, see Pickard and Pearce (forthcoming).

13. Philosophers debate the nature and strength of the connection between intentional and belief; the connection suggested here is very modest, claiming only that one cannot rationally form an intention to do something if one believes that one cannot do it. Of course, one can rationally form an intention *to try* to do something, if one is unsure but believes that one *might* be able to do it. For discussion of the philosophical debate see Holton (2009).

severe psychological distress typically experienced by patients with comorbid psychiatric disorders and associated economic, social, and relationship problems. Put crudely, drugs and alcohol offer these patients a way of coping with intense negative emotions and other psychiatric symptoms. Hence, unless recovery from comorbid disorders is achieved or symptoms are effectively managed, better life opportunities are available, and alternative ways of coping with psychological distress have been learned, patients are not likely to forgo the use of drugs and alcohol. The cost is too great, the alternative goods on offer too few. There is a compelling reason to continue to use. Chronic addiction is a rational choice for such patients, unless they can be given hope for a better life.

LESSONS FOR RESEARCH AND TREATMENT

Addiction is not a chronic, relapsing, neurobiological disease characterized by compulsive use of drugs or alcohol. First, addiction is not a form of compulsion. Although addictive desires may be strong and habitual, they are not irresistible. There is strong evidence that addicts have the general capacity to control their use in a broad range of ordinary circumstances: They can choose to abstain from using drugs and alcohol. Note again, for clarity, that this is not to deny the genuine difficulty and cost of abstinence for addicts. Nor does it remove the possibility that addicts can be excused from blame when they don't abstain: Given the alternatives on offer, their choices and actions may be justified by duress, rather than rendered involuntary by compulsion. Second, addiction is not chronic and relapsing for the majority of the general population. Finally, for the majority of the psychiatric population, for whom addiction may be chronic and relapsing, it is not a neurobiological disease. Rather, it serves a clear purpose: the alleviation of severe psychological distress. In these cases, drug use is an instrumental means to ends that are rational to desire.¹⁴

Correcting this mischaracterization has important clinical consequences. First, psychiatric services need to be attentive to the high possibility of comorbidity when treating addiction (cf. Compton et al. 2007; Sellman 2009). In all likelihood, there are multiple causal pathways between addiction and other psychiatric diagnoses. The severe psychological distress associated with many psychiatric diagnoses may cause patients to use drugs and alcohol to cope, but then patterns of drug use may intensify other psychiatric symptoms, as well as removing protective factors, such as a stable environment or the good regard of family and friends. This, in turn, will increase distress, and with it the desire to use. This sort of downward spiral is well known within psychiatric services. Effective treatment may thus require that addiction is treated in conjunction with the comorbid disorders, minimizing the distress and dysfunction they cause

14. Note that there may of course yet be similarities between addiction and various chronic diseases with respect to factors like degree of genetic predisposition, environmental impact, anticipated course, and treatability. For discussion see McLellan et al. (2000).

in the long term and especially during the initial period of abstinence, when risk of relapse is high.

Second, effective treatment of the addiction itself should target all five folk psychological factors. To some extent, standard clinical interventions already do so. Pharmacological interventions, such as the prescription of methadone and buprenorphine, can diminish strength of desire and craving by replacing illicit heroin use with alternative opiates.¹⁵ So too can identification of triggers for substance use and the development of strategies to avoid them. The tried-and-true technique of the "five-minute rule" plausibly targets willpower. When patients experience a strong desire to use, they are told to wait five minutes. After five minutes, they try to wait five minutes more. This technique may function to change problematic behavior in at least two ways. On the one hand, it empowers patients with the knowledge that they have resisted the desire for at least five minutes; if they can do that once, they can do it again. On the other hand, over time, it may build up willpower. The development of alternative, healthy strategies for coping with distress, together with the development of the capacity to "stop and think" before acting, can provide the patient with the chance and means to manage distress differently. The provision of a strong, stable, social community, which is a component of all group-based therapy programs for addiction, increases motivation by offering an alternative good in the face of the cost of abstinence, as well as peer support to potentially strengthen decision and resolve (for further discussion see Pickard and Pearce [forthcoming]). Contingency management treatment offers ongoing and immediate positive feedback and rewards, and potentially, as a result, a clear sense of achievement and self-esteem upon which hope for the future can be built.

Nonetheless, despite these existing various pharmacological and psychological interventions, the need to target all five folk psychological factors suggests that treatment ultimately cannot depend on psychiatric services alone. Alternative goods and opportunities need to be available to addicts in order to give them lasting incentive to resolve to abstain and find their own path to recovery. This requires adequate provision of social services and employment opportunities, and, no doubt, a continued political battle against the stigma and stereotypes surrounding not only addiction, but psychiatric patients in general.

Finally, insofar as addicts must exercise willpower to abstain, work hard to learn new coping mechanisms and build a better life, and, no doubt, choose to do so in the face of a degree of unavoidable psychological distress, they are not aided by being treated as victims of a neurobiological disease, as opposed to agents of their own recovery. This is most obvious when we consider the possibility of forming a rational resolution to quit. But it is equally true

15. This replacement also reduces the risk of overdose, infection, and disease due to self-injection; provides the opportunity for a more stable, and less marginalized and criminal, lifestyle to develop where recovery and abstinence may be more realistic possibilities; and allows reduction in dosage to be gradually implemented and medically monitored, minimizing risk to the patient.

that, throughout the long and difficult process of abstinence and change required for recovery, addicts need willpower, resolve, and hope. A belief in their own self-efficacy may be crucial in maintaining these states of mind (cf. Bandura 1997).¹⁶ This belief is undermined by adhering to a disease model of addiction and thereby assigning addicts to the sick role (cf. Pearce and Pickard 2010).

The mischaracterization of addiction as a chronic, relapsing, neurobiological disease characterized by compulsive use of drugs or alcohol is thus not just mistaken, but an impediment to effective clinical and societal treatment of the problem. Addicts, like all of us, deserve empathy and compassion, but not at the expense of losing sight of their rational powers of choice and control, deliberation, and resolve. Understanding chronic, relapsing addiction requires acknowledging that it is purposive. Treating it requires acknowledging that addicts are agents—agents who use drugs as means to understandable ends. As a result, fundamentally, recovery lies with the addict's capacity to make different choices and see these choices through, ideally aided by psychiatric and societal support. We must care for people, rather than treat them with blame or derision, even while we acknowledge they are agents who make choices that may harm themselves and others.

REFERENCES

- Alexander, B. K., R. B. Coombs, and P. F. Hadaway. 1978. The effect of housing and gender on morphine self-administration in rats. *Psychopharmacology* 58(2): 175–179.
- Alexander, B. K., S. Peele, P. F. Hadaway, S. J. Morse, A. Brodsky, and B. L. Beyerstein. 1985. Adult, infant, and animal addiction. In *The meaning of addiction*, ed. S. Peele, Lexington, 77–96. MA: Lexington Books.
- Alvarez, M. 2009. Actions, thought-experiments and the “principle of alternate possibilities.” *Australasian Journal of Philosophy* 87(1): 61–81.
- American Psychiatric Association. 2000. *Diagnostic and statistical manual of mental disorders, Fourth edition, Text revision (DSM-IV-TR)*. Washington, DC: APA.
- Anthony, J. C., and J. E. Heltzer. 1991. Syndromes of drug abuse and dependence. In *Psychiatric disorders in America: The epidemiologic catchment area study*, ed. L. N. Robins and D. A. Regier, 116–154. New York, NY: Free Press.
- Aristotle. 1984. *Eudemian ethics*, trans. J. Solomon, in *The complete works of Aristotle, Vol. 2*, ed. J. Barnes. Oxford, UK: Oxford University Press.
- Bandura, A. 1997. *Self-efficacy, the exercise of control*. New York, NY: W. H. Freeman and Company.
- Berridge, K. C., and T. E. Robinson. 2011. Drug addiction as incentive sensitization. In *Addiction and responsibility*, ed. J. Poland and G. Graham, 21–53. Cambridge, MA: MIT Press.
- Bonn-Miller, M. O., M. J. Zvolensky, and A. Bernstein. 2007. Marijuana use motives: Concurrent relations to frequency of past 30-day use and anxiety sensitivity among young adult marijuana smokers. *Addictive Behavior* 32: 49–62.
- Boyd, C. J., C. J. Teter, B. T. West, M. Morales, and S. E. McCabe. 2009. Nonmedical use of prescription analgesics: A three-year national longitudinal study. *Journal of Addictive Diseases* 28: 232–242.
- Boys, A., J. Marsden, P. Griffiths, J. Fountain, G. Stillwell, and J. Strang. 1999. Substance use among young people: The relationship between perceived functions and intentions. *Addiction* 94: 1043–1050.
- Boys, A., J. Marsden, and J. Strang. 2001. Understanding reasons for drug use amongst young people: A functional perspective. *Health Education Research* 16: 457–469.
- Charland, L. 2002. Cynthia's dilemma: Consenting to heroin prescription. *American Journal of Bioethics* 2(2): 37–47.
- Charland, L. 2011. Decision-making capacity and responsibility in addiction. In *Addiction and responsibility*, ed. J. Poland and G. Graham, 139–158. Cambridge, MA: MIT Press.
- Compton, W. M., Y. F. Thomas, F. S. Stinson, and B. F. Grant. 2007. Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry* 64(5): 566–576.
- Cooper, M. L., M. Russell, and W. H. George. 1988. Coping, expectancies, and alcohol abuse: A test of social learning formulations. *Journal of Abnormal Psychology* 97: 218–230.
- Edwards, G., and M. M. Gross. 1976. Alcohol dependence: Provisional description of a clinical syndrome. *British Medical Journal* 1(6017): 1058–1061.
- Elliott, C. 2002. Who holds the leash? *American Journal of Bioethics* 2(2): 48.
- Enoch, M. A., and D. Goldman. 2001. The genetics of alcoholism and alcohol abuse. *Current Psychiatry Reports* 3(2): 144–151.
- Everitt, B. J., and T. W. Robbins. 2005. Neural systems of reinforcement for drug addiction: From actions to habits to compulsion. *Nature Neuroscience* 8(11): 1481–1489.
- Flanagan, O. 2011. What is it like to be an addict? In *Addiction and responsibility*, ed. J. Poland and G. Graham, 269–292. Cambridge, MA: MIT Press.
- Flanagan, O. Forthcoming. Phenomenal authority: The epistemic authority of Alcoholics Anonymous. In *Addiction and self-control*, ed. N. Levy. New York, NY: Oxford University Press.
- Foddy, B., and J. Savulescu. 2006. Addiction and autonomy: Can addicted people consent to the prescription of their drug of addiction? *Bioethics* 20(1): 1–15.
- Foddy, B., and J. Savulescu. 2010. A liberal account of addiction. *Philosophy, Psychiatry, and Psychology* 17(1): 1–22.

- Frankfurt, H. 2003 [1971]. Freedom of the will and the concept of a person. In *Free will*, ed. G. Watson, 322–336. Oxford, UK: Oxford University Press.
- Heyman, G. 2009. *Addiction: A disorder of choice*. Cambridge MA: Harvard University Press.
- Higgins, S. T., D. D. Delaney, A. J. Budney, and W. K. Bickel. 1991. A behavioural approach to achieving initial cocaine abstinence. *American Journal of Psychiatry* 148: 1218–1224.
- Higgins, S. T., A. J. Budney, W. K. Bickel, F. E. Foerg, R. Donham, and G. J. Badger. 1994. Incentives improve outcome in outpatient behavioural treatment of cocaine dependence. *Archives of General Psychiatry* 51: 568–576.
- Higgins, S. T., A. J. Budney, W. K. Bickel, G. J. Badger, F. E. Foerg, and D. Ogden. 1995. Outpatient behavioural treatment for cocaine dependence: One-year outcome. *Experimental and Clinical Psychopharmacology* 3: 205–212.
- Hobbes, T. 1999. *Treatise: Of liberty and necessity*, in *Hobbes and Bramhall on Liberty and Necessity*, ed. V. Chappell. Cambridge, UK: Cambridge University Press.
- Holton, R. 2009. *Willing, wanting, waiting*. Oxford, UK: Oxford University Press.
- Hughes, J. R., D. K. Hatsukami, J. E. Mitchell, and L. A. Dahlgren. 1986. Prevalence of smoking among psychiatric outpatients. *American Journal of Psychiatry* 143: 993–997.
- Hume, D. 1975. *Enquiry concerning human understanding*, ed. L.A. Selby-Bigge. Oxford, UK: Oxford University Press.
- Hyman, S. E. 2005. Addiction: A disease of learning and memory. *American Journal of Psychiatry* 162: 1414–1422.
- Jacobsen, L. K., S. M. Southwick, and T. R. Kosten. 2001. Substance use disorders in patients with posttraumatic stress disorder: A review of the literature. *American Journal of Psychiatry* 158: 1184–1190.
- Kant, I. 1960. *Religion within the bounds of reason alone*, trans. T. Greene and H. Hudson. New York, NY: Harper and Row.
- Kessler, R.C., P. Berglund, O. Demler, R. Jin, K. R. Merikangas, and E. E. Walters. 2005a. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry* 62: 593–602.
- Kessler, R.C., P. Berglund, O. Demler, R. Jin, K. R. Merikangas, and E. E. Walters. 2005b. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry* 62: 617–627.
- Khantzian, E. J. 1985. The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry* 142: 1259–1264.
- Khantzian, E. J. 1997. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard Review of Psychiatry* 4(5): 231–244.
- Kuntsche, E., R. Knibbe, G. Gmel, and R. Engels. 2006. Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behavior* 31: 1844–1857.
- Leshner, A. I. 1997. Addiction is a brain disease, and it matters. *Science* 278(5335): 45–47.
- Levy, N. 2011a. Addiction and compulsion. In *A companion to the philosophy of action*, ed. T. O'Connor and C. Sandis, 267–273. Oxford, UK: Blackwell.
- Levy, N. 2011b. Addiction, responsibility, and ego depletion. In *Addiction and responsibility*, ed. J. Poland and G. Graham, 89–111. Cambridge, MA: MIT Press.
- Markou, A., T. R. Kosten, and G. F. Koob. 1998. Neurobiological similarities in depression and drug dependence: A self-medication hypothesis. *Neuropsychopharmacology* 18: 135–174.
- McLellan, A. T., D. C. Lewis, C. P. O'Brien, and H. D. Kleber. 2000. Drug dependence, a chronic medical illness: Implications for treatment, insurance, and outcomes evaluation. *Journal of the American Medical Association* 284(13): 1689–1695.
- Mele, A. 1990. Irresistible desires. *Nous* 24(3): 455–472.
- Merikangas, K. R., M. Stolar, D. E. Stevens, et al. 1998. Familial transmission of substance use disorders. *Archives General Psychiatry* 55(11): 973–979.
- Muller, C. P., and G. Schumann. 2011. Drugs as instruments—A new framework for non-addictive psychoactive drug use. *Behavioural and Brain Sciences* 34(6): 293–310.
- Muraven, M. and R. Baumeister. 2000. Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin* 126(2): 247–259.
- National Institute on Drug Abuse. 2009. *Principles of drug addiction treatment: A research-based guide*. Bethesda, MD: National Institute on Drug Abuse.
- Pearce, S., and H. Pickard. 2010. Finding the will to recover: Philosophical perspectives on agency and the sick role. *Journal of Medical Ethics* 36(12): 831–833.
- Peele, S. 1985. *The meaning of addiction*. Lexington, MA: Lexington Books.
- Perkins, H. W. 1999. Stress-motivated drinking in collegiate and postcollegiate young adulthood: life course and gender patterns. *Journal of Studies on Alcohol* 60: 219–227.
- Petersen, T., and A. McBride. 2002. *Working with substance misusers: A guide to theory and practice*. London, UK: Routledge.
- Petry, N. M., S. M. Alessi, and C. J. Rash. 2011. Contingency management treatment of drug and alcohol use disorders. In *Addiction and responsibility*, ed. J. Poland and G. Graham, 225–245. Cambridge, MA: MIT Press.
- Pickard, H. 2011. Review of *Addiction and Responsibility*, ed. J. Poland and G. Graham. *Notre Dame Philosophical Reviews* 11.01.
- Pickard, H., and S. Pearce. Forthcoming. Addiction in context: Philosophical lessons from a personality disorder clinic. In *Addiction and self-control*, ed. N. Levy. New York, NY: Oxford University Press.
- Prescott, C. A., and K. S. Kendler. 1999. Genetic and environmental contributions to alcohol abuse and dependence in a population-based sample of male twins. *American Journal of Psychiatry* 156(1): 34–40.

- Poland, J. and G. Graham, eds. 2011. *Addiction and responsibility*. Cambridge, MA: MIT Press.
- Regier, D. A., M. E. Farmer, D. S. Rae, B. Z. Locke, S. J. Keith, L. Judd, and K. G. Frederick. 1990. Comorbidity of mental disorders with alcohol and other drug abuse. Results from the epidemiological catchment area (ECA) study. *Journal of the American Medical Association* 264: 2511–2518.
- Reid, T. 1994. *The works of Thomas Reid, Vol. 2*, ed. W. Hamilton. Bristol, UK: Thoemmes Press.
- Robins, L. N. 1993. Vietnam veterans' rapid recovery from heroin addiction: A fluke or normal expectation? *Addiction* 88: 1041–1054.
- Sellman, D. 2009. The ten most important things known about addiction. *Addiction* 105: 6–13.
- Sinnott-Armstrong, W., and H. Pickard. Forthcoming. What is addiction? In *The Oxford handbook of philosophy of psychiatry*, ed. B. Fulford, M. Davies, G. Graham, R. Gipps, J. Sadler, and G. Stanghellini. Oxford, UK: Oxford University Press.
- Solinas, M., C. Chauvet, N. E. Thiriet, R. Rawas, and M. Jaber. 2008. Reversal of cocaine addiction by environmental enrichment. *Proceedings of the National Academy of Sciences USA* 105(44): 17145–17150.
- Steward, H. 2009. Fairness, agency, and the flicker of freedom. *Nous* 43: 64–93.
- Stinson, F. S., B. F. Grant, D. Dawson, W. J. Ruan, B. Huang, and T. Saha. 2005. Comorbidity between DSM-IV alcohol and specific drug use disorders in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Drug and Alcohol Dependence* 80: 105–116.
- Vaillant, G. E. 1995. *The natural history of alcoholism revisited*. Cambridge, MA: Harvard University Press.
- Warner, L. A., R. C. Kessler, M. Hughes, J. C. Anthony, and C. B. Nelson. 1995. Prevalence and correlates of drug use and dependence in the United States. Results from the National Comorbidity Survey. *Archives of General Psychiatry* 52: 219–229.
- West, R. 2006. *Theory of addiction*. Oxford, UK: Blackwell.
- Williams, B. 1995. How free does the will need to be? In *Making sense of humanity and other philosophical papers*, 3–21. Cambridge, UK: Cambridge University Press.
- Woods, J. H. 1978. Behavioral pharmacology of drug self-administration. In *Psychopharmacology: A generation of progress*, ed. M. A. Lipton, A. DiMascio, and K. F. Killam, 595–613. New York, NY: Raven.
- World Health Organization. 2004. *Neuroscience of psychoactive substance use and dependence*. Geneva, Switzerland: World Health Organization.
- Yaffe, G. 2011. Lowering the bar for addicts. In *Addiction and responsibility*, ed. J. Poland and G. Graham, 113–138. Cambridge, MA: MIT Press.