



## Review

# Addiction, cigarette smoking, and voluntary control of action: Do cigarette smokers lose their free will?



Roy F. Baumeister

University of Queensland, Australia  
The Florida State University, USA

## ARTICLE INFO

## Article history:

Received 19 January 2017  
Accepted 19 January 2017  
Available online 24 January 2017

## Keywords:

Addiction  
Smoking  
Cigarettes  
Free will  
Choice  
Voluntary behavior

## ABSTRACT

Opinions differ widely as to whether addicts lose the ability to control their behavior and employ free will. This article reviews empirical findings regarding multiple questions relevant to the issue of free will among addicted smokers: Is smoking voluntary behavior? Can people quit smoking? Why don't people quit smoking? Why do smokers relapse when they try to quit? Do addicted smokers suffer from irresistible cravings? Are there some people who cannot quit? Are there conditions that make resistance impossible? Why would they smoke knowing it can kill them? The evidence reviewed here seems most consistent with the view that smokers retain control over their actions but cannot easily stop having frequent desires to smoke.

© 2017 The Author. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Contents

1. Definitions . . . . .	68
2. Theory: free will and addiction . . . . .	68
3. Expert, practitioner, addict, and lay opinions about addiction and control . . . . .	70
4. Review of evidence . . . . .	70
4.1. Is smoking voluntary behavior? . . . . .	70
4.2. Can people quit smoking? . . . . .	71
4.3. Why don't people quit smoking? . . . . .	73
4.4. Why do smokers relapse when they try to quit? . . . . .	74
4.5. Do addicted smokers suffer from irresistible cravings? . . . . .	75
4.6. Are there some people who cannot quit? . . . . .	77
4.7. Are there conditions that make resistance impossible? . . . . .	78
4.8. Why would people smoke knowing it could kill them? . . . . .	79
5. Discussion and conclusions . . . . .	80
5.1. Summary of main findings . . . . .	80
5.2. Implications for addiction theory . . . . .	81
5.3. Implications for theory of free will . . . . .	82
5.4. Some issues for further research . . . . .	82
5.5. Concluding remarks . . . . .	82
References . . . . .	83

Views of addiction have continued to evolve and change, driven variously by societal trends, medical opinion, and research findings. This article examines the question of whether addiction impairs or even destroys free will, based on a review of the research literature on

smoking cigarettes. Tobacco addiction is probably the most common and problematic form of addiction worldwide, especially given its adverse health effects that include millions of premature deaths.

It is now generally accepted that cigarette smoking is addictive. A central dispute is whether regular smoking brings about a change in the person that impels him or her to continue smoking, in effect

E-mail address: [baumeister@psy.fsu.edu](mailto:baumeister@psy.fsu.edu).

depriving the person of voluntary control over his or her behavior (at least in connection with smoking). Volkow (2015) has even defined addiction as a disease of free will. The opposing position is that smoking remains voluntary behavior that the person chooses to continue or not (e.g., Lewis, 2016). The difference between these positions has extensive implications for psychological and philosophical theory, for motivation, for drug treatment and intervention policies, for legal assignment of responsibility, and for government policy.

## 1. Definitions

Definitions of key terms in this matter can be contentious. The core issue here is voluntary control of behavior: Do cigarette smokers lose voluntary control of their smoking insofar as they become addicted? Or do they remain responsible and in control, simply choosing to pursue the pleasures and satisfactions associated with smoking?

**Agency** is the capacity to initiate and control action. It is related to the term *agent*, as in someone who acts. It encompasses choosing, initiating action on one's own, and accepting responsibility for one's chosen actions.

**Voluntary control** has multiple meanings. For present purposes, it can be understood as indicating that the person is capable of choosing between performing the action and not performing it. Voluntary control means that the power to decide resides within the individual: the person is capable of making a conscious decision and implementing it. Loss of voluntary control means that the person is incapable of acting differently, either because of external forces or unconscious causes. With regard to addictive smoking, loss of voluntary control means that smokers cannot stop themselves from smoking.

**Free will** is understood as the capability to act in different ways, subject to the person's own control and serving the person's reasons, goals, wishes, and choices. A recent and authoritative definition, based on an interdisciplinary committee working for a granting foundation, defined free will as the capability of performing free actions. Free actions, in turn, were defined in two ways. One was "any intentional action performed on the basis of informed, rational deliberation by a sane person in the absence of compulsion and coercion." The other invoked multiplicity of possible actions (i.e., the person could do two or more different things) in a given situation as constructed by all prior causes and events (Haggard, Mele, O'Connor, & Vohs, 2010). Thus, in simple terms, free will is the capacity to act in different ways in the same situation. It thus overlaps considerably with voluntariness. Shepherd (2012) showed that most people do not accept unconscious free will, so free will entails conscious control of action. The term "free will" is a traditional usage but modern theorists generally do not postulate "will" as a distinct psychological entity, so it would be more precise to speak of free action (e.g., Mele, 2006, p. 17).

The definition of **addiction** has continued to evolve over time. Initially it meant simply strong, usually passionate liking for something. More recently it has become understood as liking for something of which society disapproves, and possibly having strong, recurrent desires that the person might at times wish he or she did not have. Thus it has acquired a connotation of desiring something that is bad for the self, as well as being unable to stop or avoid those desires. Orford (2001) captured this aptly by saying that the prevailing usage of the term "addiction" has evolved from an initial concept as simply an attachment to something, becoming now *conflict about attachment*. In his understanding, addiction is an attachment so strong that the person experiences difficulty in avoiding the activity even when it causes harm. The Royal Society of Canada (1989) noted that in the research community, definitions of addiction had recently shifted away from earlier emphases on cravings and withdrawal (dependence) toward more behavioral definitions, including failure to stop using even when the user was strongly motivated to stop. The failure to stop despite wanting to stop suggests that the addict's free will is limited, insofar as the addict is unable to act as he or she wishes.

**Rationality** is understood as the calculation of enlightened self-interest, which means figuring out logically what is best for the self (including in a long-range perspective). Rational action means acting on the basis of rational calculation. Rational calculations about whether to smoke would include short-term pleasure, risk of becoming addicted, well-documented long-term health risks, financial cost, inconvenience, and possibly other factors such as social pressure. Rational calculations about whether to quit smoking would include possible improvements in health and reduction of further risks, fear of weight gain, the unpleasantness of withdrawal, and the potential futility of trying (i.e., eventual relapse). Ainslie (2001) has pointed out that it is almost always rational to have one more cigarette, because the cost and health risk associated with a single smoke are negligible whereas the pleasure is almost certain — but of course the cumulative effect of always having one more cigarette can add up to significant damage to health. Thus, one paradox of addiction is that the accumulation of rational decisions produces an irrational result.

**Withdrawal** refers to a set of feelings and symptoms that occur when an addict ceases using a substance. When people quit smoking, they often experience a mixture of the following reactions: feeling grumpy, impatient, and easily irritated; sleep disturbances such as waking up at night; anxiety; hunger and increased eating; gaining weight; depression; unpleasant and occasionally strong cravings for a cigarette; and general restlessness (Hughes, 1992). Withdrawal symptoms vary in different persons, but most symptoms are gone after about four weeks on average (Hughes, 1992).

## 2. Theory: free will and addiction

Addiction, free will, and smoking are all contentious issues. My focus is on whether addiction to smoking cigarettes eliminates or reduces a person's free will, as opposed to leaving it intact.

Much of the ongoing dispute about free will stems from using different, incompatible definitions. Some theorists define it as causation of behavior by immaterial souls (Montague, 2008), or as exemption from causality (Bargh, 2008). My efforts to construct a scientific theory of free will must reject both those approaches (see Baumeister, 2008, 2014; Baumeister & Monroe, 2014). The notion of free will endorsed here is *responsible autonomy*: That is, free will consists of two main things. One is autonomy, in the sense that behavior is caused by factors inside the person, such that behavioral choices are ultimately made by the individual. To be sure, external factors will have influence, but free will means autonomy in the sense of self-government and thus ultimately being able to decide as unity, somewhat independent of the external environment. Responsibility means that the individual understands the implications and contingencies and makes the choice with an acceptance of the possible consequences.

Free will thus entails that the person recognizes multiple options and can choose consciously which one to realize. Loss of free will would mean that the person becomes unable to choose some options. In the absence of free will, the person has no choice and can only do one thing, regardless of the person's values, conscious wishes and preferences, and so forth.

The theoretical question is therefore whether addiction eliminates the person's capacity to choose. When an addict smokes or uses some other substance, is it a free choice in which the person could have done otherwise? Or has the person lost the capacity to choose and become helpless in the face of impulses and opportunities to smoke?

Policy issues ride on these. If addicts are consenting adults who freely choose to smoke, then a liberty-oriented government should presumably recognize their right to enjoy smoking as they please, as long as they do not harm others. In contrast, if addicts lose free will, they should be regarded as the equivalent of children or severely impaired individuals who cannot take care of themselves and cannot be trusted to make responsible choices — in which case it may be appropriate to

intervene and dictate what they must do, even to the point of prohibiting them from smoking at all.

Heuristically, it may be useful to set out three competing views about addiction and free will. One is that addicts retain free will and thus continue to resemble non-addicted adults as responsible, autonomous adults. The opposite is that addicts lose free will with regard to the addiction. (Whether they retain free will in unrelated aspects of their lives could be debated.) The third position is somewhere in between, which is that an addict's choice to smoke or use is still a free choice but somehow less free than a non-addict's choice. The intermediate position smacks of namby-pamby compromise, although intermediate positions often prevail in scientific disputes. It would be incumbent on the intermediate position to specify in what sense addicts retain free will and to what extent they lose it.

Thus, ultimately the core theoretical question is whether the addict could refrain from smoking. If yes, then the addict has free will. If no, then free will has been lost. If in between, it is necessary to specify in what sense the capacity to refrain remains and in what sense it has been diminished.

To anticipate my conclusion, I think addicts retain free will in the sense that they have autonomous control over their actions and are responsible for them. Addicts however lose control over their motivations, so that they find themselves frequently (though perhaps not strongly) desiring to smoke. They are thus unable to cease wanting a cigarette. But they remain able to decide whether to act on those desires.

In other words, the question of addiction and free will may be wrongly phrased. Addiction is about motivation, whereas free will is about behavior. Motivation is one input into the control of behavior, and a free agent would presumably often consider his or her desires when choosing how to act. But to say addiction undermines free will would require asserting that this particular motivation renders all other aspects of action control ineffective.

By way of a comparison that will be useful to invoke at several points below, some motivated desires are in fact irresistible. Beyond a certain point, a person becomes unable to resist urinating, falling asleep, sneezing, blinking, vomiting, or ceasing to stand. It is noteworthy that these all involve bodily functions that are biologically ineluctable, rather than simply involving liking something very much. It is therefore a fair question whether addiction resembles these. In contrast, it may be something more like sexual desire, which can be extremely strong but is generally assumed to remain subject to conscious control. Rapists, for example, are not exculpated based on claiming irresistible sexual desire.

The debate about free will and addiction often takes the form of two simplistic, opposing theories. These form the basic context for the present review, but both strike me as implausible. One is that free will entails that the addict freely chooses to use the drug on all or most occasions and indeed self-consciously makes the decision to become addicted and smoke many cigarettes over many years. The other depicts the addict as overwhelmed by powerful, irresistible desires that render conscious choice and free will irrelevant, indeed making it hopeless to try to resist. These may be extreme forms or even caricatures, but they are likely to be adopted by opponents because they invite easy counterarguments. Note, however, that latter view (overwhelming cravings) is not only used by opponents but by some who embrace its conclusion. Indeed, experimental studies and surveys by [Vonasch, Clark, Lau, Vohs, and Baumeister \(2017–this issue\)](#) have confirmed that many people in the general public associate addiction with loss of free will, in the form of being unable to resist addictive cravings.

Framing the issue as an addicted unconscious militating against conscious control that wishes to abstain is likely an oversimplification. In particular, [Baumeister and Vonasch \(2015\)](#) noted that effortful self-regulation is sometimes used to facilitate and sustain drug use, not just to resist. And initially, the unconscious may resist drug use, for example if the first cigarettes are unpleasant. For analyses of free will, the important point is whether the conscious agent retains the capability of both

smoking and not smoking. I assume that once addiction is in place, the unconscious and automatic responses mostly favor continuing to smoke. Consciousness may therefore either acquiesce in the automatic responses that favor continuing to smoke or resist them.

Addiction, in this view, is essentially a change in the unconscious processes, which become accustomed to seeking pleasure through smoking and therefore frequently emit impulses to light up. The conscious mind, as the seat of free will, can then choose whether to comply. For the most part, smoking cannot happen without some degree of conscious, voluntary participation, which would indicate that conscious free will has aligned itself with the automatic impulses to smoke. Loss of free will would entail that the conscious mind no longer retains the capability to resist the automatic impulses, originating in the unconscious, to smoke. These would essentially be irresistible urges that overwhelm any chance for conscious control.

Alternative, more nuanced views are however available. [Tiffany \(1990, 1999\)](#) has argued that cravings are neither necessary nor sufficient for addictive behavior. Instead, he proposed that many addictive patterns are automatic behavioral sequences that can be activated by environmental cues based on conditioned learning, even in the absence of conscious desire. For example, one may be in the habit of having a cigarette right after jogging or dinner or sex, and in that situation one may light up without being prompted by any subjective craving.

Developing a full account of how addictive behaviors conflict with and coopt conscious control is beyond the scope of this paper, but several key aspects are worth articulating. Free will is generally understood as involving conscious control ([Shepherd, 2012](#)). Still, conscious control does not operate in a vacuum but rests on automatic and unconscious processes (e.g., [Baumeister, Masicampo, & Vohs, 2011](#)). So the factors that cause an addict to smoke begin with automatic, unconscious responses: either a desire for a cigarette or the habitual response to certain cues. Conscious control may comply with that impulse, or resist it, or simply fail to interfere. The first of these (compliance) means that the addict is overtly making a free choice to smoke, contrary to any assertion that addiction involves loss of free will. The second (resistance) is often the focus of debates about free will. Successful resistance can be sign as a positive sign of exercising free will, whereas failure suggests that free will has indeed become ineffective. The third case (non-interference) may however be relatively common. The person lights up out of habit or when prompted by external cues. This does not signify exercise of free will, but neither does it indicate any loss or failure of free will. It is possible that the person retains full-fledged free will (and by extension could refuse to smoke on that occasion) but fails to use it.

A further complication arises from my operative definition of free will as responsible autonomy. Responsibility requires that the person knowingly accept the consequences of his or her actions. Do smokers accept the health risks (and other potential consequences) of their smoking? On the one hand, it is difficult to imagine any modern citizen being unaware that smoking carries significant health risks. On the other hand, people may rationalize or ignore these, in which case they are dodging responsibility for their actions. Some relevant findings indicate that smokers devalue the future more than others (for review, see [Barlow, McKee, Reeves, Galea, & Stuckler, 2016](#)). Some of this is due to the fact that people who discount the future are more likely than others to smoke, but some of it may reflect motivated self-deception. The costs of smoking lie in the distant future, whereas the pleasures are immediate, so ignoring the future removes a major objection to enjoying another cigarette. The self-deception hypothesis is further bolstered by the finding that ex-smokers resume valuing the future after they quit (e.g., [Secades-villa, Weidberg, Garcia-Rodriguez, Fernandez-hermida, & Ho, 2014](#)). Thus, once they no longer need to ignore the future in order to rationalize continued smoking, these individuals value the future as much as others.

These links between self-deception and free will are complex. Addicted smokers might honestly not claim to have fully appreciated the dangers of smoking — but that was because they ignored the

warnings or convinced themselves that they themselves would not be harmed. This is perhaps a viable case for partial free will and addiction. It depicts smokers as fully capable of not smoking, but the smokers fail to exercise free will in a responsible fashion because they have deceived themselves about the consequences of their actions.

### 3. Expert, practitioner, addict, and lay opinions about addiction and control

At present, much of the general public and much of the medical establishment believe that addiction entails a loss of control over one's actions, and thus a loss of agency or free will. Among researchers, opinion is more widely divided as to whether addicts lose some control, lose all control, or retain control.

The view that addicts lose control over their smoking or drug use may remain popular in some circles partly because several parties have a strong vested interest in sustaining it. As others have noted in some detail (see Davies, 1997; Peele, 1998), persons who abuse drugs and alcohol often prefer to avoid responsibility for their destructive actions. Denying that they could control themselves is potentially helpful in dodging responsibility. That is, people prefer to say "I cannot stop" as they continue to indulge their pleasure-yielding habits, rather than saying "I could stop but I choose to enjoy myself regardless of the cost." The medical establishment likewise gets strong benefits from regarding addiction as out of control, because it means that people need professional (medical) help, and so the popular belief that addiction constitutes uncontrollable behavior puts money in their pockets, as Davies (1997), Schaler (2000), and Heyman (2009) have pointed out.<sup>1</sup>

Given that both the people who use addictive substances and their medical treatment providers reap benefits from sustaining the belief that addictions signify loss of control and cancel moral responsibility, it is not surprising that this view has remained prominent and influential. A survey of people who provide addiction treatment by Russell, Davies, and Hunger (2011) found that for-profit service providers tend to think of addiction as a disease — a view that conveniently justifies their charging money for their services. In contrast, other providers tended to think of addiction as a choice and/or as a way of coping with difficult life circumstances. Not-for-profit service providers, for example, tended to think of addiction as a choice rather than as a disease.

The view that addiction entails loss of control and of free will has been criticized as counterproductive. Various authorities such as Chapman (2009), Schaler (2000), and Peele (1989) have noted that it undermines smokers' (and other addicts') confidence that they can quit. Chapman (2009) observed that Australia had a highly successful anti-smoking campaign that dramatized the dangers of smoking but did not tell people that they needed professional help to quit. Most Australians who quit never even called the toll-free public service numbers that had been set up to encourage quitting. This cultural endorsement of self-reliance encouraged smokers to believe they could do it on their own, and many did quit in just that way.

Expert opinion tends to be more divided and nuanced. I know of no systematic survey evidence, but it is helpful to consider recent compilations of multiple viewpoints. A target article on addiction in *Behavioral and Brain Sciences* by Redish, Jensen, and Johnson (2008) was published with 25 commentaries intended to capture the range of expert opinion. At most two of these insisted that addiction meant full loss of control. The rest, including the authors of the target article, could be classified as in either the full or partial control categories. Several authors pointed out that even drug addicts show rational patterns that resemble how normal people generally behave, such as when influenced by habits or

contemplating an uncertain future. There was considerable evidence, both in the article and in the commentaries, that addicts are still exerting plenty of control over their actions. Several noted, for example, that true compulsions are indifferent to the price of something, whereas cigarette smokers and drug users do modify their behavior in response to price. Even heroin addicts choosing between money and heroin will make different choices depending on how much money is involved. Thus, even heroin addicts can make rational choices regarding whether to use heroin, contrary to the notion that addiction is a loss of free will.

A similar conclusion emerges from a recent compilation by Poland and Graham (2011) called *Addiction and Responsibility*. The contributors to the volume seem divided between the full control and partial control positions, with almost no one arguing that addiction entails a full loss of control. (Charland's, 2011, chapter opined that addicts lack free will — but then he asserted that nobody has free will. The view that nobody has free will is espoused by various thinkers, and obviously from that perspective it is pointless to argue about whether addiction reduces free will.)

Thus, some people assert that addiction entails loss of free will, but most advocates of that view gain some benefit from it. Researchers' opinions are mostly divided between full control and partial control.

### 4. Review of evidence

The following sections will review empirical findings pertaining to the question of whether addiction entails loss of free will. I shall consider a series of questions that offer perspectives on the question of whether addicts retain or lose full free will — or something in between.

#### 4.1. Is smoking voluntary behavior?

Voluntary behavior means that the person could have chosen to act differently, and as such it overlaps with free will. Hence one simple approach to the question of free will among smokers is whether their actions are performed voluntarily or not. There are several criteria useful for answering that.

A very basic, medical and biological basis for deciding whether a behavior is voluntary is whether it uses the voluntary muscles. These are a category of striped (striated) muscles, generally attached to skeletal bones. Without question, smoking involves considerable use of voluntary muscles. The actions of opening the pack, holding the cigarette, lighting it, bringing it to the mouth, and inhaling all rely on voluntary muscles, not to mention the actions of purchasing cigarettes and walking to designated smoking-permitted areas. There is some question as to whether the involuntary muscles are used at all in smoking, apart from the activity of the bronchioles of the lungs, which come into play only after the smoke has already been inhaled. In any case, it is clear that smoking is mainly voluntary by this definition. Addiction would not change this, such as by enabling involuntary muscles to take over.

A sign of involuntary muscles is that they are often controlled by specific centers in the spine or nervous system, without the brain having any control. Conscious efforts to alter them are ineffective. For example, bright lights cause the eye pupils to dilate (become larger), which is a response executed by involuntary muscles (see Morsella, 2005, on conscious control and pupil dilation). The person cannot control this by act of will. Even if someone were offered a thousand dollars to refrain from dilating his or her pupils, if a light shines on them, they will dilate. In that sense, pupil dilation is involuntary, and it is nothing like smoking. Almost any smoker would refrain from lighting up on a particular occasion if offered a thousand dollars. Indeed, studies reviewed by Heyman (2009) show that addicts do respond to incentives and readily forego drug use, even for considerably less than a thousand dollars. Thus, again, smoking appears to be voluntary behavior.

Another approach to understanding voluntary behavior is to look specifically for actions that are initiated from within the organism under centralized control. This is probably the most influential

<sup>1</sup> This is not to suggest that physicians misrepresent the facts because they are motivated by financial, self-serving motives. Rather, it simply acknowledges that many physicians, like most human beings, will be more attracted to theories that validate their work and improve their financial prospects than to rival theories lacking those features.

definition of voluntary behavior. Involuntary behaviors, in contrast, would include reflexes, tics, and other automatic responses, which are initiated by external stimuli or by isolated internal processes independent of, and sometimes contrary to, central control. Again, smoking is highly voluntary. The cigarettes do not light themselves and inject smoke into the body.

Two other important features of voluntary behavior are planning (also called premeditation) and adaptation. Premeditation means the person contemplated and perhaps mentally rehearsed the action ahead of the occasion of performing it, such as by designing a specific sequence of actions or carrying out preparatory actions. Adaptation means making adjustments to the behavior while one carries it out. Genuinely involuntary behaviors, such as sneezing, blinking, or sudden vomiting, lack these features.

Smokers normally exhibit both premeditation and adaptation. In order to smoke, one typically has to plan ahead in order to purchase cigarettes and matches. It is illogical to suggest that smoking is involuntary if smokers plan ahead to do it. Planning may also extend to finding a place to smoke. The smoker often has to change location, insofar as smoking is prohibited in many places today, including restaurants and office buildings. A smoker must often go outside or to a designated smoking area, and doing this is thoroughly voluntary behavior.

As for adjustments along the way, they too are readily apparent in smoking. If the entire sequence of smoking were involuntary, then it would be all of a piece, so that there would be a straight and rigid line from the first impulse of wanting a smoke to consuming the cigarette. If something went wrong – for example, the lighter failed to light, or the cigarette went out – the sequence would be interrupted and would have to start over again. However, smokers are not deterred by these temporary setbacks and they do what is another hallmark of voluntary behavior, which is find alternate pathways (e.g., get another lighter). In the same way, if a smoker is lighting up and another person points out a “No smoking” sign, the smoker exhibits voluntary behavior by interrupting the process, moving to another place, and resuming the smoke there – or in some cases simply foregoing the cigarette altogether.

Turning to social definitions of voluntary vs. involuntary behavior, these tend to emphasize external control: Did someone else force the person to do something? Layperson definitions of free will tend to emphasize doing things without external coercion and, in particular, doing things contrary to external influence (Monroe & Malle, 2010; also Stillman, Baumeister, & Mele, 2011). To argue that smokers have no free will in the social sense is comparable to saying they performed the action under duress, such as when someone is forced at gunpoint to write a check or sign a contract. Under such circumstances, people will indeed do things against their will (and use voluntary musculature). But smokers are clearly under no such external pressure.

In fact, one could build upon the social definitions of freedom versus external constraint to argue that smoking is an exceptionally strong instance of free will. External agents today typically discourage the practice. There are all manner of external influences that discourage smoking and sometimes prohibit it outright. If people pressure you to quit smoking, if you are bombarded with anti-smoking warnings and exhortations (e.g., printed right on the pack of cigarettes), if there are laws and rules that discourage smoking in various places – but you smoke anyway, then your behavior is highly voluntary in the social sense.

Another sign of voluntary behavior is that it can be interrupted, postponed, or otherwise altered to adjust to external rules. It is instructive to consider truly involuntary behaviors, such as uncontrollable vomiting during the abrupt onset of food poisoning. In contrast, smokers adjust remarkably well to labyrinthine rules and regulations, including unforeseen obstacles. When the urge to smoke arises, they typically are not overcome and needing to let it happen, as happens with sudden onset vomiting. They may wait until a television commercial comes on to interrupt the show they are watching, or until the movie or conversation

or lecture or meal is over, or until halftime in the ball game. They then go find a place where smoking is permitted. If that turns out to be unexpectedly unavailable – perhaps there is something else happening there right then, or perhaps it is just raining – they find somewhere else. Such adjustments are standard signs of voluntary behavior.

Compliance with rules is a strong sign of voluntary behavior and there is even an argument that the capacity for voluntary behavior evolved to its advanced, human form precisely to facilitate complying with rules (Baumeister, 2008; Baumeister & Monroe, 2014). If smoking were involuntary, then when the urge arose, the person would smoke, and that could not be stopped. But if a person has ever refrained from smoking for the duration of an airplane flight or a movie or other event, that indicates conscious control and the ability to resist the impulse to smoke. Below I shall cover work by Dar et al. (2005, 2010) providing further evidence of how smokers adjust pretty well to rules such as prohibitions to smoke during a religious Sabbath or airplane flight.

Another relevant observation is that many smokers go on smoking for years and then quit rather abruptly as a result of some symbolic or meaningful event. As noted by Russell and Davies (2009), these unplanned and unassisted quittings are often quite successful. The triggering event is typically something that gives the smoker a new motivating reason to quit. Such events can include a brush with death, a milestone birthday (e.g., turning 30), becoming a parent, and the death from lung cancer of a relative or acquaintance. These suggest that many smokers continue smoking because they enjoy smoking and do not have a sufficiently compelling reason to give up their enjoyment of the habit. When some external event supplies them with a reason, they do quit. The implication is that they had the capacity to quit all along (after all, experiences of the sort described do not change one’s physical dependency on tobacco or one’s stock of willpower). They simply did not have a reason to choose to exert it.

Yet another sign of voluntary behavior is that people adjust what they do on the basis of their values. Baars (1993) noted that one useful indicator of voluntary behavior is that it is consistent with the person’s dominant value hierarchy. In smoking, values do make a difference. Zhang, Cowling, and Tang (2010) showed that the more strongly smokers endorsed anti-smoking values, such as the moral wrongness of secondhand smoke and the need to resist pro-smoking propaganda, the more they were likely to have quit smoking for at least a brief period of time.

The evidence that aspects of smoking are voluntary is extensive. It is difficult to imagine anyone insisting that all the behaviors associated with smoking are involuntary. To be sure, some aspects, such as feeling the desire to smoke, are clearly involuntary. Thus smoking is a mixture of voluntary and involuntary, which is true for almost every known form of behavior. If there is anything peculiar about smoking, it lies in how recurrent desires to smoke intrude and tempt the free agent. There would only be a difference in free will if the transition from (involuntary) desire to enacting the behavior were unstoppable.

At most, one could say addictive smoking is like urination. It has many public restrictions, so people must plan for it and use voluntary muscles to go to designated places. Still, one could argue that urination becomes absolutely inevitable in a way that smoking probably does not.

#### 4.2. Can people quit smoking?

Central to the free will question is the issue of whether an addict is capable of quitting. If the person is capable of quitting but continues to smoke, then it seems fair to say that the person voluntarily chose the action. In that case, the smoker remains in control of his or her actions and in that sense is exercising free will.

Failures to quit smoking are probably at the heart of the idea that smoking and other addictions constitute loss of free will (see Volkow, 2015). Many smokers and other addicts express the desire to quit – but then continue using. Either they change their minds (as free agents can certainly do), or their conscious resolve to quit is indeed

overwhelmed by automatic, unconscious and other forces. The latter would be consistent with the view that addiction entails loss of free will.

The view that addicts generally, and smokers in particular, are powerless to control their addictive behavior is difficult to sustain in light of evidence that many quit. Millions of people have quit addictions, especially to cigarettes. Indeed, before 1960 the majority of American men smoked cigarettes, as noted by the Surgeon General's 1988 report — and by the time that report was written, the figure had already dropped below a third (29%; USDHHS, 1988). Although part of that change is caused by deaths and the emergence of a new generation containing many people who have never smoked, it also reflects a substantial amount of quitting. Already in 1986 the American Cancer Society reported that 37 million Americans had quit smoking since the first Surgeon General report, and 90% of these had done so on their own, without professional assistance (American Cancer Society, 1986). In 1999 the Center for Disease Control reported based on survey results that half the Americans who had ever smoked had quit. Clearly people can quit smoking (Centers for Disease Control, 1999).

Christakis and Fowler (2008) reported that social networks are influential as to smoking and quitting. People become more likely to quit if their spouse, a friend, a sibling, or work colleague quits.<sup>2</sup> The fact that many people quit in concert with their friends and loved ones is a sign that their behavior is not something that is out of control. Rather, smoking responds to cues from the social environment, and when the cues favor quitting, many people quit. To suggest that addicts lose free will but regain it when their friends abstain would require an implausible extension of free will theory.

The view of smoking (and addictions generally) as highly resistant to quitting was bolstered in part by misleading statistics based on sampling error. As Chapman and MacKenzie (2010) pointed out in an article entitled “The Global Research Neglect of Unassisted Smoking Cessation,” most studies have been done on addicts who are in intensive, medically administered treatment programs. These typically produce short-term success and long-term failure. However, these samples differ in important ways from the general population of smokers. People in medical treatment or therapy for smoking are much more likely than others to have mental health problems alongside the addiction, and these mental health problems often help bring about a return to addictive behavior once the treatment has ended.

An earlier report by Schachter (1982) made the same point. He said the widespread view is that smoking is extremely difficult to quit, but yet everybody seems to know people who have quit successfully. He said the explanation may be “embarrassingly simple” (p. 437): People who can quit by themselves do so, while others go to professional experts, and the research studies are based mainly on the latter. Hence the studies are done with an atypical group who has extraordinary difficulty quitting. The stereotype of addiction as incurable may be “flatly wrong. People can and do cure themselves of smoking, obesity, and heroin addiction. They do so in large numbers and for long periods of time, in many cases apparently permanently” (p. 442).

The mistake resembles prior misperceptions that resulted from studying clinical samples. The most famous was probably the categorization of homosexuality as a mental illness. The first studies of homosexuals were done with those in clinical treatment, and they often concluded that homosexuals were neurotic. But neuroses are common in psychotherapy — heterosexuals in psychotherapy are neurotic too! Eventually, homosexuals in the general public came forward to insist that homosexuality did not coincide with mental illness, and when researchers explored non-clinical samples, they agreed. The misperception of homosexuality thus arose from reliance on clinical treatment samples for data, and it was corrected by a movement to call attention to the larger population. Note that no such correction is likely for

addicts, even if the cases were exactly parallel. Homosexuals *suffered* from being categorized as mentally ill, and so some of them stood up and demanded to be recognized as being normal, healthy, responsible citizens. Addicts, in contrast, *benefit* from being categorized as having an illness. It is hardly surprising that there has never been a movement of healthy, well-adjusted addicts standing up to demand that they be recognized as responsible citizens. As noted above, addicts favor the view that addiction entails loss of free will (Davies, 1997; Peele, 1998; Schaler, 2000).

To be sure, classification of some pattern as psychopathology is not as objective and immutable a matter as classifying laws and elements of nature. They may reflect useful therapeutic practices. Societal norms long regarded homosexual behavior as something that ought to be prevented or “cured”, and many homosexuals shared that wish. Then tolerance and acceptance spread, and homosexuality ceased to be regarded as a sickness. In parallel albeit in reverse direction, nicotine dependence has come to be classified as a disorder, whereas prior to 1980 it was just smoking. This shift also likely reflects changes in society's attitude toward less tolerance and less acceptance of smoking.

Some research has examined representative samples (i.e., normal people from the whole population) rather than clinical ones. They typically find that substantial numbers of people quit smoking (and other addictions). Indeed most of them do so without treatment. This pattern has been repeated with various addictions, even including heroin, starting with the famous studies by Lee Robins (e.g., Robins, Helzer, & Davis, 1975) on Vietnam veterans, many of whom became addicted to heroin while overseas but relatively easily shifted to a non-addictive life upon returning home. Clinical samples of heroin addicts tend to be full of mental illnesses and other psychological problems, and their prognosis is poor. Outside of therapy, the majority of heroin addicts cease being addicted on their own, usually when heroin use becomes incompatible with the demands of adult life (see Heyman, 2009).

Even among people who continue to smoke for decades, many quit repeatedly. This should be enough to prove that they have considerable control over their behavior. If someone can quit for even a day or two, that establishes that the behavior is voluntary. A truly involuntary behavior would not be susceptible to deliberate quitting.

A variation on the theory of involuntary behavior is that addicts may start using voluntarily but then become trapped by fear of withdrawal. Ainslie (2001) noted that this was for a time the prevailing expert opinion. Once people became addicted, they supposedly had to continue using even if they wanted to stop, because the withdrawal would be so aversive that they did not want to suffer through that. But this view was discredited. Addicts, even heroin addicts, often quit many times over, thus suffering through withdrawal but then going back to using. Also there can be considerable addiction to drugs such as cocaine, which do not have a major withdrawal aspect. Along similar lines, Russell and Davies (2009) noted that the degree of severity and unpleasantness of the withdrawal seems to have no reliable effect on smoking relapse rates.

The withdrawal from cigarette smoking can be acutely unpleasant, to be sure. But it is temporary, and so what matters is the will (bolstered perhaps by social support) to ride it out. In a report on the withdrawal experiences of self-quitters, Hughes (1992) found that many unpleasant feelings and symptoms such as irritability, cravings, and weight gain increased when the person quit but generally dissipated within two to four weeks.<sup>3</sup> So if one can hold out for a month, the quitting has been fairly successful and is likely to last. Volpp et al. (2009) cite evidence that most relapses occur within the first month, and 90% occur within six months.

<sup>2</sup> Quitting by a neighbor had no effect. The contrast between the neighbor and sibling suggests that it is social proximity, not geographical proximity, that is decisive, and this too suggests it is not physical exposure so much as symbolism that is relevant.

<sup>3</sup> Heart rate, hunger, and especially weight gain did not go away that fast, and indeed the weight gain seemed to be more or less permanent. Weight gain is probably not a symptom of withdrawal but rather a reflection of the fact that smoking cigarettes suppresses appetite for food, and so the normal appetite returns when one quits.

Temporary quitting in the form of abstaining for a period of many hours also seems to be possible for many smokers. A pair of studies by Dar et al. (2005); Dar, Rosen-Korakin, Shapira, Gottlieb, and Frenk (2010) has shown this. One documented how Orthodox Jews, who are forbidden to smoke on the Sabbath, get through it routinely and even do not seem to have very strong cravings once they have formed the habit. Another study with flight attendants showed how they manage long flights. The desire for a cigarette mostly seems to cooperate, remaining low when smoking is forbidden and increasing only when the opportunity gets closer (e.g., the sun starts to set denoting the end of the Sabbath, or the plane nears its destination).

In the study of Orthodox Jews, the participants were also asked to abstain from smoking during a regular workday. Two balked at this when it was first explained, but the rest all seem to have completed it successfully. This shows the behavior remains under voluntary control despite long deprivation (24 h). It could also fit the idea that some people (in that study, 2 of 22, or just under 5%) are unable to quit, though those presumably were able to do it on the Sabbath.

In sum, smokers can quit, and most smokers do quit. Some of them quit repeatedly and most abstain according to circumstances. Insofar as loss of free will means inability to abstain from smoking, smokers retain free will. The fact that many people resolve to quit but then continue smoking is most parsimoniously interpreted as an indication that they change their minds rather than that they are powerless to stop using, especially given the previous section's evidence that smoking is voluntary behavior.

#### 4.3. Why don't people quit smoking?

The previous section established that most smokers can quit, taking away one possible sign of lack of free will. Yet clearly many smokers do not quit, even though some of them say they would like to quit. If they can quit, why do they not do so?

Smoking is addictive, which means that once a person has smoked regularly for some time, his or her body will crave more smoking, especially when the body's level of nicotine begins to drop because nicotine is leaving the body and no new dose has been ingested to replace it. Smokers probably cannot stop themselves from having these desires, but they may still be able to refrain from acting on them.

In effect, once a person has become addicted to smoking, he or she has a double contingency. First, smoking brings pleasure, which people continue to enjoy and would rather not live without. Second, not-smoking brings the minor but pervasive (albeit temporary) unhappiness of withdrawal. Both of those argue against quitting.

The idea that physical addiction entails compulsion to smoke has been popular with addicts but lacks crucial evidence to back it up. As Schaler (2000) argued, physical diseases have physical markers, and an autopsy can usually find evidence of these diseases – but there is no physical marker associated with addiction that would enable an autopsy to differentiate someone who was compelled to smoke from someone who merely liked to do so and chose to do so. In the words of Russell and Davies (2009), “The only evidence we have that people can't stop is people say they can't stop...”. These claims are of course multiply suspect. People cannot know all the inner processes that contribute to their behavioral decisions, and claims of being unable to stop are self-serving insofar as they allow the person to escape responsibility. Plus, eventually, most people do stop, despite all claims about having been unable to quit.

Smokers may systematically overestimate the difficulty of quitting. A well-controlled study by Sayette, Loewenstein, Kirchner, and Travis (2005) asked some smokers to estimate how much they would crave smoking at various future points in a 45-min interval if they could not smoke (after they had already abstained for 12 h). The smokers predicted a steady increase in strength of urge. But when (other) smokers actually experienced exactly the same situation and reported their urges, there was no increase at all. Actual cravings went up and down

across the 45 min period. Thus, smokers falsely believe that if they do not get to smoke, their cravings will get stronger and stronger, possibly rising to irresistible levels. These incorrect predictions may prevent them from trying to quit (or at least help them rationalize not quitting).

According to surveys cited by Volpp et al. (2009), 70% of contemporary smokers want to quit, but each year only 2 or 3% succeed in quitting permanently. That discrepancy challenges the view that smokers have free will. Many others quit for short amounts of time and then relapse, which as noted earlier presents a theoretical conundrum. If one assumes that the unpleasant withdrawal is the major barrier to quitting and that the withdrawal symptoms are worst at first (then gradually disappearing; see Hughes, 1992), then one must assume that the first days of quitting are the worst. Why would someone suffer through those bad days and perhaps through the entire month of withdrawal and then relapse?

The attraction to and desire for the pleasure of smoking certainly constitute one factor that brings them back. Many people resume smoking, even after successfully quitting, because they miss the pleasure, satisfaction, relaxation, and other subjective benefits of smoking. There seems almost no other way to explain relapse after withdrawal has passed (i.e., relapse after a month or two of successful abstinence). People remember the pleasure of smoking and wish to have it again. It is hard to cite loss of free will as cause of relapse after months of abstinence.

It would seem that in order to stay off cigarettes, one has to have personal reasons to resist the lure of the pleasures of tobacco (a lure which is intensified by present or prior addiction). That would explain the surprising finding by Coombs, Li, and Kozlowski (1992) that older heavy smokers have among the highest rates of successful quitting. One would expect that someone who has smoked heavily for many decades would have a terrible time trying to quit, but in fact their quit rate is high. Their motivation to quit rises as the health problems loom larger, which occurs inevitably as one gets older and health issues come to the fore.

Further evidence for the importance of a desire to quit was provided by Volpp et al. (2009). They noted earlier work had provided only mixed evidence about whether offering cash incentives makes smokers more likely to quit. But Volpp et al. (2009) criticized prior work for having used rather small incentives, which are insufficient to motivate the person to resist the beckoning pleasure of smoking. (Indeed, an experimental study by Nordgren, van Harreveld, & van der Pligt, 2009, found that a 12-euro or \$16 incentive was often insufficient to motivate smokers simply to resist smoking a cigarette for about two hours, if that involved holding an unlit cigarette in their mouth while watching an entire movie that romanticized smoking.)

In their own study, Volpp et al. (2009) offered moderately sized incentives, adding up to \$750 for staying smoke-free for a year. The sample was particularly impressive as it was not a sample of people who were seeking to quit; instead, all smokers working for a particular large corporation were approached for the study. The incentive tripled the rate of successful quitting, as measured by a biochemical test administered 9 to 12 months after the start. A follow-up six months later, after all incentives had been paid and no more were pending, found that the ones who had had the incentives were still about three times more successful at maintaining abstinence than the no-incentive control group, though some in both groups had gone back to smoking.

The effectiveness of these moderate incentives is another sign that smokers can quit if they are sufficiently motivated. The motivation must be there to sustain quitting for the long term and must be sufficient to enable them to resist a great many urges and cravings. It is not easy but it can be done. In that connection, it is noteworthy that some participants in the Volpp, Troxel, Pauly, Glick, Puig et al. (2009) study, around 20% of the total sample, were able to quit and abstain successfully for an entire year (often to earn the incentive) but then resumed smoking once there was no more money being offered. As soon as the prospect of earning money was gone, they apparently no

longer had sufficient reason to continue abstaining from smoking, and the combination of remembered satisfactions, recurrent cravings, and circumstances attracted them back to the habit. Clearly, they were capable of quitting, as indicated by having gone for a year without a cigarette. But they only quit if they had a sufficient reason to forego the pleasure of smoking.

In other words, they could quit, but they only did so if they wanted strongly enough to quit. This would seem to fit the view that addicts and ex-addicts continue to have desires to smoke and perhaps cannot avoid having those desires — but they can avoid smoking. Addiction changes the motivations but the individual retains control over his or her behavior.

Reviewing multiple studies, [Potenza, Sofuoglu, Carroll, and Rounsaville \(2011\)](#) concluded that offering rewards and incentives for abstinence are often effective. Some of the largest effects in addiction treatment research come from offering people money and other rewards for abstinence. Thus, addicts can abstain if they want to do so for the sake of a reward.

Research with animals has shed light on the question of whether drug addicts (though obviously not smokers) can't or simply won't quit. Early studies documented how laboratory rats become addicted to heroin. When given the option to self-administer heroin right in its cage, a rat typically would do so to excess, becoming thereby addicted. Many rats would forego food and other vital activities in order to devote themselves exclusively to taking heroin, leading in some cases to death. These studies were influential in shaping the modern view of addiction as compulsory drug-taking that can lead to self-destructive extremes. If animals will sacrifice their lives just to take more drugs, then drug addiction must be more powerful than the basic self-preservation instincts. By analogy, human addicts were likewise assumed to be powerless.

A remarkable and ambitious set of studies known as the Rat Park research program changed this view ([Alexander, Coombs, & Hadaway, 1978](#); [Alexander, Hadaway, & Coombs, 1980](#)). These researchers began by noting that the rats who took heroin until they died lived in small, bare cages — environments that offered no alternative activities to compete with the intense pleasures of the drug. To remedy this, the researchers created in the laboratory something resembling a happy neighborhood, where rats could run free, interact with other rats, explore and play. This was called the Rat Park. In this environment, the rats did not take narcotics until they died.<sup>4</sup> They did not even become addicted. Those who were first addicted and then introduced to the Rat Park overcame their addiction. These studies are not widely known to the general public, but they fundamentally challenge the view of addiction as a drug that forces animals (or people) to keep taking it no matter what the cost. It appears that even addicted rats can make choices, and if they have something to choose other than morphine, they do not become slaves to the drug. By analogy, when a drug is the only pleasure in someone's otherwise miserable, lonely life, the person is more likely to become addicted than if the drug must compete with many other comparably strong but safer pleasures. It seems likely that a similar process was operating among the heroin-addicted soldiers studied by [Robins et al. \(1975\)](#). Heroin highs were highly appealing in the alternately boring and dangerous environment of Vietnam, but when they returned to civilian life stateside, they found better things to do.

A recent study by [Fidler and West \(2009\)](#) investigated why many smokers continue to smoke instead of quitting, especially in view of health risks, disapproval by friends, social stigma, expense, and other drawbacks. The most commonly cited answers were enjoyment of smoking and relief from stress. Among men, the top reasons were the pleasure of smoking and also that they liked being a smoker. For

women, stress relief was a top reason, as was weight control. Other prominent reasons were to socialize (especially among the young) and that smoking relieves some pain (mainly among older people).

It is important to record that the smokers did not say that they were unable to stop or were terrified of withdrawal symptoms. The closest thing to such a reason was the statement that “I feel bad when I try to quit,” which only 10% of smokers mentioned. Thus, this sample of smokers did not claim a lack of free will when explaining their behavior. Rather, they explained continuing to smoke as a way of obtaining various rewards and satisfactions, which is consistent with the exercise of free will.

A particularly relevant aspect was that the more reasons people had for smoking, the more likely they were to be classified as dependent or addicted. To be sure, those data are correlational and therefore we do not know whether having many reasons contributes to addiction or, instead, addiction causes one to develop or discover more reasons to smoke. Regardless, these findings indicate that people have reasons to smoke that reflect personal decisions and voluntary behavior. One would not likely get such answers if one asked people why they sleep or urinate, which are obligations of nature and are only minimally subject to voluntary control. Having reasons is further evidence of voluntary control.<sup>5</sup>

Another point is that [Fidler and West \(2009\)](#) found that enjoyment was cited more commonly among older than younger smokers. This implies that people continue to smoke because they enjoy it. If this were a matter of some practice that people adopt because of pleasure but then become trapped in by addiction, beyond their control, we would expect the opposite pattern, by which young persons smoke for pleasure and older ones not. Instead, it suggests that continuing to smoke reflects a pattern of personal enjoyment and satisfaction. People who do not get that much pleasure out of smoking quit. Those who get a high yield of pleasure continue to smoke.

#### 4.4. Why do smokers relapse when they try to quit?

Thus far I have sought evidence of loss of free will in an ostensible inability to quit (despite trying) and in a failure to try to quit. Next, I consider perhaps the most promising sphere: smokers who quit and then relapse. Many smokers quit smoking but then resume smoking after a few days, weeks, or months of abstinence. The reasons for this are relevant for evaluating free will. Is it plausible that the addiction exerts an irresistible pull even after it has been defeated for a period of time?

To address the question of why smokers relapse when they encounter cues that remind them of the smoking, [Niaura, Rohsenow, Binkoff, Monti, Pedraza et al. \(1988\)](#) surveyed the research literature to test several competing theories, all of which invoked learning and conditioning models. The one that fared best held that “compulsive drug use is maintained by appetitive motivational processes” (p. 135). Even when an addict has abstained for a substantial period of time, he or she may have cravings, and a brief lapse reminds the person of the pleasures of smoking (or other addiction), thereby rekindling the desire to smoke.

Relapse among people trying to quit smoking was predicted by two factors in a study by [Shadel and Mermelstein \(1993\)](#). One was the belief that the person would be unable to cope with stress without smoking. The other was the belief that smoking would reduce stress and/or help one cope. Alongside finding evidence for the main effect of those two, Shadel and Mermelstein found evidence for their interaction. Not surprisingly, smokers who had high confidence that they could cope without smoking and did not think smoking really helped them cope

<sup>4</sup> These studies were done with morphine, which is for relevant purposes the same as heroin, and indeed heroin was originally invented as a supposedly less addictive substitute for heroin.

<sup>5</sup> Perhaps oddly, the questionnaire did not include the item “I am unable to quit” or “Quitting is impossible.” It would have been interesting to see how often people endorsed that item. Of course, if quitting were truly impossible, then other reasons would be irrelevant, which would have made the study silly. Nobody seems to have objected to the questionnaire by saying the only major reason, impossibility of quitting, was not included.



had the fewest urges and problems. These findings suggest the use of free will by smokers: They use smoking to help them cope with stress.

Having the occasional cigarette (a so-called lapse) is sometimes considered a good way to temporarily reduce cravings but may trigger further urges to smoke. Shadel, Martino, Setodji, Cervone, Witkiewitz et al. (2011) had smokers quit smoking and then randomly assigned half of them to smoke one cigarette a couple days after quitting. Smoking that one cigarette produced a substantial decrease in desire to smoke, consistent with the view that having a cigarette satisfies one's cravings, at least temporarily. However, those who lapsed were twice as likely to relapse (i.e., resume regular smoking) as those in the control condition. Thus, when smokers quit, they may feel unpleasant desires to smoke, and having a cigarette relieves those desires — but also stimulates new desires later on. Having a cigarette after quitting thus seems to rekindle the pleasure of smoking.

A key insight was provided by Sayette and Hufford (1995) and confirmed by subsequent work. The urge to smoke changes and feels different after one resolves to quit. More precisely, the desire for a cigarette is pleasant to a regular smoker — but becomes unpleasant to someone trying to quit. Other evidence confirms that the actual desire to smoke becomes weaker, not stronger, as soon as one quits (Shiffman, Engberg, Paty, Perz, Gnys et al., 1997). But it becomes unpleasant rather than pleasant, and that is a powerful and influential shift. The implication is that when smokers try to quit, they fail because of the desire for pleasure, not because they are overwhelmed by irresistible cravings. Addiction means that the body has frequent mild desires to ingest nicotine, and when one tries to quit, these become frequent, mild, and unpleasant feelings — that could be relieved by having a cigarette.

The phenomena of relapse after a period of abstinence thus do not establish a loss of free will. It would indeed be a complicated theory that sought to explain that addiction allows smokers sufficient free will to quit for a time but then afterward nullifies their free will so as to cause relapse. Rather, the evidence seems consistent with the model that smokers continue to desire to smoke, and at some point of low willpower, they decide to resume seeking pleasure in that way. This does however bring up the alternative hypothesis that cravings escalate so as to become irresistible, to which the next section turns.

#### 4.5. Do addicted smokers suffer from irresistible cravings?

One way to articulate the anti-free-will position would be that addictive cravings become irresistible. The very definition of irresistibility signifies loss of control, as in the absence of the possibility to choose otherwise. In effect, or at least in caricatured stereotype, the addict becomes possessed by overpoweringly strong desires for the substance and is unable to do anything except to get a fix. A particularly plausible version of this hypothesis would be that desire increases gradually and steadily since the most recent cigarette, eventually becoming overwhelmingly strong. If cravings continue to grow stronger, they might eventually be experienced as irresistible, which by definition entails loss of free will (i.e., the person is literally unable to resist the desire).

Are there such things as irresistible cravings? Baumeister, Heatherton, and Tice (1994) considered this question at length. Their tentative conclusion was that yes, there are irresistible cravings, but very few. No one can stay awake forever, and so the urge to sleep can become irresistible, as can the urge to urinate or to cease standing up after many hours. In such cases, even if someone held a gun to the person's head and threatened to shoot if the person succumbed, the person would succumb regardless. The gun-to-head test is a reliable indicator of a truly irresistible urge. Desires to smoke a cigarette do not seem to rise to that level. It is bizarre to imagine a smoker lighting up despite a gun to the head.

Research evidence likewise contradicts the notion that irresistible urges prevent addicts from quitting. One of the most thorough studies of desire in everyday life tracked people's desires as they went about their daily lives (Hofmann, Baumeister, Förster, & Vohs, 2012). Desires

for a cigarette were exceptionally weak — on average, they were the weakest of all desires that people reported. Thus, the typical smoker's average desire for a cigarette is exceptionally mild, compared to other desires that people have on an everyday basis.

There is another set of highly pertinent findings from the Hofmann et al. (2012) study. Participants rated a substantial minority of their desires as "irresistible." Literally that means that they subjectively believe a particular desire is so strong as to preclude resistance. Contrary to Baumeister et al.'s (1994) assertion that irresistible desires are few and circumscribed, people did report a wide range of irresistible desires. Even so, desires for tobacco were not usually rated as irresistible. About 2.5% of desires for tobacco were rated as irresistible — the lowest rate of any category. Thus, desires for tobacco are easier to resist than all other desires, in general, but people do occasionally report very strong desires as irresistible.

Moreover, in practice the participants did not treat these ostensibly irresistible desires as irresistible. They often reported trying to resist them. What's more, when they did resist, they were generally successful. A literal interpretation of these findings would be that most "irresistible" desires are successfully resisted. That conclusion is however self-contradictory. The most plausible explanation is that people overestimate how difficult it will be to resist a particular desire. This mistake may be highly relevant to the persistence of cigarette addiction. In reality, cravings for cigarettes (even among addicts) may be persistent, usually not that strong, and fully resistible. But addicts imagine that if they try to quit, their cravings will become overwhelmingly strong so that resistance will become impossible. They may capitulate and indulge relatively weak desires on the assumption that resistance will ultimately be futile. They overestimate the strength of desires, misinterpreting resistible desires as irresistible. They wrongly interpret moderate, resistible desires as irresistible, and they wrongly surmise that if they resist current desires, these will steadily grow stronger until they become overwhelming. Calling a desire irresistible might also be a rationalization for yielding to it.

Evidence supports this interpretation of mistaken expectations of future powerful cravings. Gwaltney, Shiffman, and Sayette (2005) found that the stronger the desire for a cigarette, the less one predicted one's ability to resist it. In a sense that is logical: the stronger the desire is, the less resistible it is, assuming a finite and fixed capacity to resist. But because people overestimate the strength of the desire, they correspondingly underestimate their ability to resist it.

Another relevant finding was that alcohol consumption had no effect on how well people expected to be able to resist cravings (Gwaltney et al., 2005). It is well established objectively that alcohol consumption reduces people's resistance to any sort of desire (e.g., Baumeister et al., 1994; Hofmann et al., 2012). Alcohol does not make cravings stronger but lowers glucose (the energy needed for self-control), and intoxication impairs judgment. People fail to realize intuitively that alcohol consumption weakens the self's ability to control and restrain. Thus they fail to anticipate that having consumed alcohol will increase the likelihood of smoking and smoking relapse.

Other studies have examined what happens to urges during periods of abstinence and deprivation. The evidence suggests that many smokers do anticipate that if they could not smoke, their desires would gradually become stronger and stronger — but they are mistaken. A well-designed study by Sayette et al. (2005) included a condition in which smokers had to abstain for 12 h prior to coming to the lab, then light a cigarette, hold it, and then put it out without taking a puff. All this was designed to maximize their craving. They then estimated how strong their cravings would be across the next 45 min if they were prevented from smoking. Generally people predicted that their cravings would get stronger and stronger. Another group, however, went through the same deprivation and lighting up without smoking and then actually reported their cravings across the subsequent 45 min. Their cravings did not increase but just stayed at the same level with minor up-and-down fluctuations.

Thus, smokers believe and anticipate that if they abstain, their cravings would escalate, but in fact cravings do not escalate (though they fluctuate). The idea that cravings will increase possibly to the level of becoming irresistible is largely a myth. Nonetheless, this mistaken expectation undermines the resolve to abstain by making it seem doomed to eventual failure. This is not a loss of free will, but rather a fully agentic decision that gets misguided and biased.

Other studies have examined what happens when people actually try to quit. One landmark study by Shiffman et al. (1997) measured cravings among smokers across time, starting before they quit and continuing afterward. They found that cravings diminished sharply as soon as the person quit. (This is consistent with the findings by Dar and colleagues, already discussed, about flight attendants and Orthodox Jews: these individuals largely cease to crave cigarettes during periods of enforced abstinence.) In general, their urges were *stronger while they were smoking than after they quit*: Only a tiny minority (14%) reported ever (even once) having a craving after they had quit that was stronger than the strongest craving they had reported beforehand. Moreover, the general trend was that the longer the person abstained, the weaker the cravings became, and the less frequent were episodes of temptation to smoke. These findings are highly important, because they directly contradict the ideas that cravings grow stronger once one quits smoking, and that attempts to quit smoking fail because the person is eventually overwhelmed by powerful cravings. Cravings grow weaker, not stronger.

The Shiffman et al. (1997) study followed up to see who relapsed and who did not. Relapse was unrelated to strength of craving. People did not necessarily relapse when they felt the strongest urges; indeed strength of urge at the present moment was unrelated to relapse. (Strength of urge on quit day and strength of urge when first awakening in the morning were better predictors of who would relapse.) This too speaks against the view that relapse occurs because of overwhelming cravings. How strong the cravings are has little statistical impact on relapsing.

Shiffman et al. (1997) also identified “temptation episodes,” defined as brief periods of strong desire to smoke. These are of interest because even though a smoker who quits mostly seems to have low desire to smoke, now and then the desire becomes stronger, such as when the person feels bad emotionally, drinks alcohol, and/or spends time with others who are smoking. But relapse was unrelated to how often people experienced these temptation episodes. (Moreover, these temptation episodes were generally brief, lasting under an hour, and the urge to smoke merely went back to what it was before quitting, rather than becoming extremely strong.) Instead, the main factor was how long these temptation episodes lasted. Thus, apparently, relapse occurs because people have a relatively weak desire to smoke that lasts a relatively long time, not because they are overwhelmed by powerful or irresistible urges.

A survey of research studies on smoking and other addictions by Wertz and Sayette (2001a) confirmed that cravings are weaker after quitting. They found that the desires to smoke, drink, or use drugs depend on whether the person will be able to do so. Smokers and other addicts who expect to be able to smoke or use drugs in the near future report strong cravings. Those who do not expect to smoke, such as because they have quit and/or are in treatment for addiction, report significantly weaker cravings. Physiological measures that show bodily responses to smoking cues showed the same effect, so the finding is not just a matter of refusing to admit that one has cravings. Experimental work by the same authors yielded the same results: Expecting to smoke increases cravings (Wertz & Sayette, 2001b). Indeed, the sooner they expect to smoke, the stronger the urge, even across very brief intervals (Sayette et al., 2003).

A subsequent study by Shiffman et al. (2002) did manage to find that smokers (who were trying to quit) were more likely to smoke when they had stronger rather than weaker desires to smoke, but even this finding underscores the relevance of control. First, the effect was only

found after imposing statistical controls for restrictions on smoking. That proves that smokers still have control. In other words, a smoker is more likely to smoke when he really wants to than when his desire is weaker — but only when circumstances permit smoking. That is, a “No Smoking” sign eliminates the difference of strong versus weak cravings on whether people smoke.

The fact that smokers refrain from smoking when there is a “No Smoking” sign might be dismissed as trivial. I find it highly relevant, however, not least because of the position that free will evolved precisely (at least in part) to enable people to follow rules (Baumeister, 2005, 2014; Baumeister & Monroe, 2014). The broader framework is that the distinctively human traits are adaptations to make culture possible (Baumeister, 2005; Suddendorf, 2013; Tomasello, 1999, 2014, 2016), and culture only works insofar as people follow rules. To the extent that smokers are able to control and alter their behavior based on rules, they have free will.

Furthermore, in the Shiffman et al. (2002) study, the effect of strength of urge was found only at the low end. Strength of craving was rated on a scale from 0 (no craving) to 10 (maximum strong craving). Likelihood of smoking increased as urges went up from 0 to 6, but beyond that, strength of craving made no difference. The opposite would be predicted if one believed that irresistible impulses compelled one to smoke. It is not the powerful, irresistible impulse that causes smoking, but rather the difference between a very weak and a moderate desire that affects whether smokers relapse or abstain.

The idea that smokers make mistakes because they make flawed predictions about the future is bolstered by other evidence. Bickel, Odum, and Madden (1999) found that smokers generally discount the future more than other people. This result was based on financial choices, such as questions like “Would you rather have \$1,000 a year from today, or \$800 today?” Smokers placed lower today-value on a future thousand dollars than non-smokers and ex-smokers. Specifically, getting a thousand dollars a year from how was equivalent to \$825 for non-smokers and ex-smokers, but it was only worth a shocking \$575 to addicted smokers. More broadly, smokers discounted the future in comparison to the present, more than other people. This again suggests that addicted smokers make systematic errors in planning, because they disregard the future in comparison with the present. Smoking addiction, like other addictions, depends on precisely this sort of error: The pleasures of the present are weighted more heavily than the possible costs in the future. (And one could debate philosophically whether that is in fact an error.)

Further evidence that addicts make errors in predicting the future was provided by Gwaltney, Shiffman, Balabenis, & Paty (2005). Building on past evidence that smokers overestimate how pleasant smoking will be, they showed that people attempting to quit smoking often overestimate how much better they would feel if they resumed smoking. A key finding of their work is that lapse does not inevitably lead to relapse. In fact, they found that on average, after someone quit smoking, there were 29 lapses (having a cigarette) before full-blown relapse. This again is a strong argument that smokers retain control over their actions. It also suggests that some lapses are less pleasant than anticipated.

Thus, smokers are bad at predicting the future. There are competing theories as to why this is true, and the current state of knowledge is not able to establish which of these is correct. One theory is that a deficient ability to predict the future is a psychological factor that predisposes someone to become and stay addicted. (However, ex-smokers predict and value the future just as well as those who have never smoked.<sup>6</sup>) Another theory is that smokers defensively develop a reluctance to contemplate the future, because the costs of smoking (and other addictions) lie in the future whereas the pleasures and joys lie in the present. A third theory, that smoking itself damages the ability to

<sup>6</sup> This finding could alternatively be interpreted to mean that smokers who are better at predicting and valuing the future are more likely to quit.

think about the future, is implausible given that the mental effects of smoking in general constitute improvement, not impairment.

Quitting is itself partly about predicting the future. Gwaltney, Shiffman, Balabanis et al. (2005) found that the day before true relapse, smokers had exceptionally weak expectations of being able to resist and also had exceptionally strong expectations that smoking would make them feel good. Assuming such fluctuations in confidence reflect simply fallacies in prediction, the implication is that smokers who try to quit often succumb to flawed or unreliable notions of what the future will bring if they do vs. do not smoke.

Thus, the evidence contradicts the view that smokers who quit are overwhelmed by irresistible cravings. They have generally weak cravings, but some of them imagine (falsely) that these will grow stronger and become irresistible, and so they think they might as well go ahead and smoke now. Whether this is a rationalization or an honest mistake is difficult to ascertain. It is however not an incapacitation of free will.

#### 4.6. Are there some people who cannot quit?

The previous sections established that many, probably most, people can quit smoking, as many do. In that particular sense, free will would seem to be intact among smokers, including addicted smokers. Still, there could be exceptions: The general pattern could be true but there could be a significant minority of smoking addicts who have lost their free will. To say that somebody was unable to quit therefore entails a claim that he or she was different from most smokers. There would presumably be a need to establish justification for the fact that unlike most smokers, this particular person was physically unable to quit.

It is quite difficult to prove the absence of exceptions to any rule. Clearly, most people can quit smoking. But how would one establish scientifically the presence or absence of an atypical minority of smokers who absolutely cannot quit, and whose free will is therefore irrefutably compromised?

The idea that some people have a compulsion to smoke while others do not have it creates a variety of complications. As already noted, it is clear that society as a whole does not embrace the distinction. Legal prohibitions against smoking assume all smokers are capable of compliance. If there were indeed some people who were incapable of refraining from smoking, exceptions would have to be made, and the signs would have to read “No Smoking Except by Addicts.” But there are no such signs. The fact that law and social practice assume all smokers can comply with restrictions is one piece of evidence against the assertion that some smokers have lost free will with respect to smoking.

On the other hand, the possibility that some can quit while others cannot is at least plausible. It seems clear, as one relevant sign, that some people find quitting more difficult than others. With nearly all addictions and even all appetitive behaviors, including such things as sex, alcohol, and gambling, there is typically a distribution in which most people use in moderation and a small number use to excess (Orford, 2001). Thus, what is a relatively harmless and easily controlled pleasure for many becomes a problematic, even costly or destructive habit for some. Drawing a sharp line between the addicted and non-addicted may not be possible in such cases, but there are at least degrees of difficulty in relinquishing the attachment to the activity.

Abundant other evidence indicates that quitting is more difficult for some than others — which would be consistent with, though not proof, that it is impossible for some. Studies by Piasecki, Niaura, Shadel, Abrams, Goldstein et al. (2000); Piasecki, Jorenby, Smith, Fiore, and Baker (2003) have shown that withdrawal experiences vary across persons, and relapse is more likely among those who suffer more intensely during withdrawal than among others. The thrust of that work is that withdrawal symptoms fluctuate in somewhat random manner, though more among some people than others, and episodes of high craving promote lapse and even relapse.

Likewise, people differ as to how easy it is to quit. Chapman and MacKenzie (2010) cite a British survey of ex-smokers indicating that just over half said it was easy to stop smoking, while the rest were divided between saying it was fairly difficult and very difficult. Still, these had all managed to quit, even if they found it very difficult. People clearly also vary substantially in their character strength and self-control, so undoubtedly there would be others who likewise found quitting “very difficult” and therefore gave up. So this survey provides no direct evidence that some people are unable to quit, but the evidence of the range of difficulty would be compatible with the existence of a more extreme group, not showing up in the survey, who found quitting so difficult that it was in fact impossible for them. It would be fair then to say that they had lost their free will in this regard (or even never had it).

Hence the idea that some addicts or smokers are incorrigible is dubious on an a priori basis and at odds with some facts and findings, but still potentially correct in some cases. In other words, at present no evidence confirms that some smokers are absolutely unable to quit, having lost free will in that regard absolutely; but there is no definitive contrary evidence, either, and so the possibility remains alive (and an important challenge for further researchers). Nonetheless, it is possible to screen the extant literature for assorted evidence pertaining to favored versions of this hypothesis.

One place to look for evidence for incorrigible addicts would be old, heavy smokers, that is, people who have smoked a lot for a long time. This category presumably would be the most likely to include people incapable of quitting. Yet several studies have found that they can quit after all. Coombs et al. (1992) found that older, heavy smokers actually had the highest rate of successful quitting (including both unassisted quitting and program-assisted quitting). This is one strong piece of evidence against the view that some smokers cannot quit. Instead, it suggests that as smokers recognize the health risks and costs — which become clearer and more intense as one gets older — they do summon up the willpower to quit.<sup>7</sup>

The behavior of not-quitting is not itself proof of inability to quit (unless one takes the determinist philosophical position that all behaviors are inevitable). In other words, it is fallacious to conclude that someone cannot quit from the fact that the person does not quit. Exercise is a useful analogy. Like quitting smoking, exercising is nearly universally extolled as a vital step toward improving health and prolonging life. Across many different walks of life, majorities tend to say that exercising is good and that they should exercise. Many people do exercise regularly. Others do not, however, even though many of them ardently advocate the value of exercise and even express the intention to exercise. Is there some basis for assuming that these large numbers of non-exercisers are unable to exercise? More likely, day after day they find other things more appealing to do than exercising. In the same way, smokers may vaguely advocate quitting but continue to find that they would rather have another cigarette. A famous early statement of this conundrum was the prayer by St. Augustine, asking God to help him achieve chastity but not just yet.

The claim that someone was unable to quit smoking or start exercising, whereas the majority is able to do so, is questionable precisely because it is impossible to verify or falsify. Some objective basis is needed for distinguishing the hypothetical person who supposedly cannot quit smoking or cannot commence exercising from the person who could do so but simply does not want to make the effort and undergo the arduous, unpleasant process. As Schaler (2000) and others have pointed out, there is no such basis anywhere in the literature. In his

<sup>7</sup> In that study, old heavy smokers were more successful than old light smokers, which was surprising. It is possible that the health costs stand out more to the heavy smokers, especially as they get older, so they become more motivated than light smokers to quit. Another possibility is that some heavy smokers cut down and become light smokers. This could fit the view that they were unable to quit entirely but were able to substantially reduce their habit. Thus, these findings could fit the partial control theory as well as the full control theory.

famous exposition of the view of addiction as a brain disease, Leshner (1997) said that taking drugs is initially voluntary but at some point of continued use, “a metaphorical switch is thrown” that transforms the brain and produces compulsive drug-seeking and drug-taking. However, he conceded that this switch remains at the level of metaphor. Schaler emphasized the fact that there is no known way to tell an addict's brain (or any other bodily organ) apart from that of someone who used the same drugs without being addicted.

Applying the same reasoning to smoking, we would have to say that there is no known medical or biological way, including autopsy, to tell the difference between a smoker who was unable to quit and another smoker who smoked the same amount but was, like most smokers, able to quit. Schaler adds that for almost any genuine disease, it is possible to point to specific biological indicators – but there is no such biological marker for addiction. Hence claiming to be incurably addicted to smoking is at best a weak analogy unsupported by the standard sorts of evidence. To be sure, it remains possible that one will be found, possibly in the brain. At present, however, there is no such evidence, and perhaps none will ever be found.

One influential theory has held that those who continue to smoke today are in fact different from those who have quit, in the sense of being less able ever to quit. The hypothesis of “hardening of the target” was initially put forward by treatment providers in order to provide an explanation for low or dwindling success rates in some treatments and therapies. The argument goes that, although many people have quit successfully, those were the ones for whom quitting was easy, and they have left behind a hard core of heavily addicted smokers who cannot quit. These people come to treatment programs and the like, but the high failure rates of these treatments could be regarded as simply a reflection that these are incorrigible cases. In other words, this theory says failure should not reflect badly on the treatment providers but rather on the people they are trying to help.

Their hypothesis of the hardening target was addressed in a collection of articles commissioned by the National Cancer Institute and published in their monograph, *Those Who Continue to Smoke* (U.S. Department of Health and Human Services, 2003). These articles pulled together research evidence from multiple sources to evaluate the question and to make the best case for the idea that there is an increasingly incorrigible minority of addicted smokers. Here I summarize the findings as reported by the multiple contributors to that monograph.

The evidence against the target-hardening theory included the following facts:

- If the target were hardening, quit rates should be going down in general. But quit rates have not changed across the population.

- If the addictive behavior is beyond a person's control or ability to stop, then a change in the price should not have any influence. But smokers today seem just as influenced by price increases as those in the past. If the target were hardening, price increases would make less difference (Burns & Warner, 2003). If anything, price increases seem to have more impact on heavy than on light smokers, which is the opposite of what one would predict if the heavy smokers in particular cannot control their smoking (Burns, 2003). (To be sure, price increases affect heavy smokers more than light smokers, because of the higher volume of purchases.)

- If the target were hardening, quit rates should be especially low in places where there are relatively few smokers, because only the die-hards remain. But quit rates are high in such places, based on state-by-state comparisons (Burns & Warner, 2003). These high quit rates suggest influence of social pressure, which presumably is higher in states where few people smoke, as opposed to places where there are many smokers. In other words, the same person who continues to smoke in one setting would quit successfully in a different social setting.

- Hardening of target would suggest that more smokers show the signs of strong addiction, such as having the first cigarette soon after waking, and smoking more cigarettes overall. Yet there has been no change in these measures (Burns & Warner, 2003).

Meanwhile, the case in favor of hardening of the target is much weaker. Two main findings encourage that conclusion:

- In published studies of professional treatment programs, quit rates have gone down over time (Hughes & Burns, 2003; also, especially Irvin & Brandon, 2003). Contrary to the hardening hypothesis, however, there appears to be no change in the number or proportion who stay smoke-free for one year after the end of the treatment. Thus, the change is merely in terms of the short-term success of the treatment programs. Another confounding factor has been that smokers in treatment are now older than in earlier studies, and correcting for this reduces the evidence for change over time. That is, there is still some evidence that treatments are becoming less successful, but it is weak.

- A cross-sectional comparison of European countries found that countries with lower overall rates of smoking had higher rates of dependence (addiction) according to the widely used Fagerstrom scale (Hughes & Burns, 2003). This does not reflect change over time but simply a comparison of different cultures and therefore is less conclusive than comparisons across time.

Indeed some data cited by the NCI report suggest that the target may be softening, not hardening. Studies in California, where exceptionally thorough data are available, suggest that there are now more casual and occasional smokers than previously. Other evidence indicates that the number *and* proportion of heavy smokers, defined as people who smoke at least 25 cigarettes a day, have gone down – whereas hardening of the target would mean they would go up (Burns, 2003). This could also be a matter of partial control, however, such as if some strongly addicted heavy smokers do not quit but instead merely cut down and thereby transfer themselves into the light-smoker category.

The hardening target theory was the best-known version of the idea that some smokers cannot quit. The evidence has failed to support it and indeed makes it look wrong. This is a strong blow against the idea of the incorrigibly addicted minority, but it does not definitely prove that it is wrong. As noted, though, that will be almost impossible to prove. At the extreme, there could be a minority of one person who for some reason is physically unable to quit smoking, and there is no way of proving that such a person could not exist.

Recent evidence suggests that enjoyment of smoking helps explain the difference between those who do and those who do not succeed at quitting. Strong, Leventhal, Evatt, Haber, Greenberg et al. (2011) measured the pleasure of smoking among people who were getting ready to quit. The more they enjoyed smoking (indicated by positive change in emotional state from before smoking to afterward, during the run-up to quitting), the more likely they were to fail at quitting. Given that most smokers enjoy smoking to some degree, that very enjoyment militates against successful quitting. The broader implication is that smokers fail to quit because they enjoy smoking – the more they enjoy it, the less likely they are to quit, even though they may try.

Based on the data, the default assumption should be that most or all smokers can quit (though some will find this more unpleasant and difficult than others). The evidence is consistent with the view (outlined in the Theory section, above) that addicts experience frequent desires for whatever it is they are addicted to. They cannot make these desires stop, but they remain fully capable of deciding whether to act on them. Leshner's hypothesis that voluntary behavior becomes involuntary over time would predict that older smokers would find it relatively impossible to quit, but as we noted the evidence indicates that they have some of the highest quit rates.

#### 4.7. Are there conditions that make resistance impossible?

Clearly most smokers can resist most cigarettes most of the time. If addiction does not generally destroy free will, might it do so on some occasions? It is perhaps useful to consider what sorts of circumstances might arise that would make it literally impossible for a given smoker to resist having a cigarette at that moment. My reading of the research literature suggests it has not found such conditions: Control over

behavior remains voluntary. The legal system seems to agree, as already noted in this report: When smoking is prohibited, there are no exceptions granted for addicts, which would be necessary if smoking were sometimes involuntary and irresistible. In contrast, urination can indeed be irresistible, and so most public spaces have facilities to enable people to urinate when they must. Smoking is not treated the same at all. Sometimes there are designated smoking areas, but often not. An airplane without a toilet would be seen as unsuited for long flights and inconsiderate even for short ones, whereas airplanes without smoking areas are now nearly universal.

If free will is not an absolute, constant quality of the person, then changes in the person's condition could affect free will. One line of my research has depicted willpower as a fluctuating resource that is reduced at times (e.g., Baumeister, 2002, 2003; Baumeister & Vohs, 2016). In principle, a person's willpower could be too low to resist an impulse, for example if the person had depleted willpower by engaging in other acts of self-control, making decisions, or coping with various problems and stresses. (That such a thing could happen is at present unproven, but possible, and its possibility is consistent with theory.) Still, for a person's willpower to be so thoroughly depleted would be an extremely rare occurrence. Moreover, the person would be in an extraordinary state. Because the same resource (a.k.a. willpower) is used for all manner of acts of self-control as well as initiative and decision making, it is fair to say that a person would have to be in a state of being psychologically crippled, at least temporarily, for him or her to be unable to resist a cigarette. In such a state, the person would be unable to find a parking space, to order off a menu, to plan an afternoon's activities, to say no to a salesperson, and so forth — almost any action that was not dictated rigidly by habit or someone else's commands. In theory some people could occasionally reach these states, but evidence is lacking.

What might happen, though, if we conceptualize behavior as a product of opposing forces of impulse and regulation, is that regulator capacity might be temporarily weak while impulse could be unusually strong, so the person would give in. Such a state would indicate at least a significant reduction in free will, if not its complete absence. This is not to say that withdrawal leads to ever-stronger impulses, but only that impulse strength fluctuates randomly, linked to expectation of pleasure, and so eventually a strong impulse will coincide with weak resistance (indeed ego depletion could intensify the subjective craving), which will be enough to trigger lapse, which in turn does causally increase the likelihood of full relapse (Shadel et al., 2011).

The point that all willpower comes from the same resource brings up the related question of the plausibility of localized loss of control. A state of extreme ego depletion, if such a thing is possible, could in principle impair the ability to resist alcohol, but it would impair all other executive function activities also. Is it plausible that addiction impairs free will only and specifically with regard to smoking (or other substance)? It is readily apparent that many addicted smokers have functioned effectively in occupational and other roles. The argument asserts that they have lost free will with regard to smoking but retain it in other behavioral spheres, but this is contrary to the weight of evidence (e.g., Baumeister & Vohs, 2016). Put another way, willpower is a domain-general resource, and so it is implausible that a person can reach a state of having none with regard to smoking but having plenty available for other activities. There would have to be a general failure of free will, and if it is on a continuum, you could estimate the loss of control over smoking from the loss of control over emotions or money or punctuality or moral virtue.

More to the point, one might propose that insofar as willpower is limited and used for many things, a person might be unable to quit smoking because he or she is directing energies (willpower) elsewhere. This is plausible. The person might be putting willpower into career, hobbies, or relationships, rather than using it to try to quit smoking. Again, however, this reflects a choice. It concedes that the person could have quit smoking but failed to do so because that was a low personal priority in terms of where to direct willpower.

Some writers (e.g., Foddy & Savulescu, 2006) have cited the philosopher Harry Frankfurt on first-order vs. second-order desires. The first-order desire is the desire to smoke. The second-order desire means desiring not to desire to smoke. Many addicts presumably experience conflict between first-order and second-order desires: They wish they did not desire tobacco, but they do desire it. This is what is felt as uncontrollable. The theory I outlined in the theory section is consistent with this. The desire for nicotine cannot be willed away, especially in an addict. There is nothing particularly unusual about this: Nearly all desires come unbidden, and hardly any desires originate with a conscious decision to want something. Nonetheless, it fits the general pattern that behavior is still under voluntary control whereas desires are not. If satisfaction reinforces desire, the addict may be saddled with frequent desires, none necessarily all that strong, but the frequency grinds one down and captures the weak moment.

#### 4.8. Why would people smoke knowing it could kill them?

Some might argue that the irrationality of smoking is inconsistent with free will. Presumably free will evolved in part to facilitate rational behavior, as in the enlightened pursuit of self-interest (Baumeister, 2005; Baumeister & Monroe, 2014; Dennett, 2003). If a free agent had been adequately made aware of the health risks associated with smoking, including possible death by lung cancer, the person would not start smoking or, if smoking had already commenced, would certainly quit at once. Or so the argument goes. No one would freely choose death, so the fact that people smoke despite its potentially lethal risk indicates that smokers do not have free will. (A contrary view was famously proposed by Menninger, 1938, indeed asserting that people take up smoking as a manifestation of death wish; but I do not think this view is taken seriously today.) This view invokes a paradox that psychology has been challenged to explain, namely why people might deliberately and intentionally engage in behaviors that are potentially self-defeating or self-destructive in their consequences.

Insofar as the pursuit of enlightened self-interest is the hallmark of human rationality, then any form of self-defeating behavior seems quintessentially irrational. As such it poses to challenge to views of human beings as rational decision makers and, by extension, to the assumption that human decision capabilities (including free will) evolved to facilitate rational choice. However, it is also apparent that people engage in a broad assortment of such irrational and potentially self-defeating behaviors. Nor are these limited to mentally ill and other pathological cases. I have repeatedly reviewed the research literature documenting the abundant persistence of irrational and self-defeating behaviors among normal, non-clinical populations (see Baumeister, 1997; Baumeister & Scher, 1988; Berglas & Baumeister, 1993).

Smoking fits two patterns that are standard across many forms of potentially self-defeating behavior. One is short-term gain combined with long-term cost. The other is definite gain but merely possible cost. When making choices, it appears common for the human mind to assign relatively greater weight to immediate outcomes than to delayed ones. This pattern is sometimes called temporal discounting (see Loewenstein, Read, & Baumeister, 2003). Likewise, the human mind assigns relatively more weight to outcomes that are assured, as opposed to ones that are merely possible, which is sometimes called the certainty effect. One could go so far as to say the human mind did not evolve to be facile with probabilistic, statistical thinking and therefore prefers to think in terms of sure things.

Both these tradeoffs are evident with cigarette smoking. The rewards of smoking are immediate, mainly in the form of pleasure and satisfaction that are experienced as soon as one commences to inhale the smoke (e.g., Rose, 2006). In contrast, the costs, such as lung cancer, typically come only after decades of smoking. Furthermore, and compounding the issue, the rewards are highly reliable whereas the costs are merely possible. A smoker can count on the pleasure of smoking as almost guaranteed. Meanwhile, getting lung cancer from

smoking is merely one possible outcome. Only 8–10% of long-term smokers actually do get lung cancer (and the comparison base rate is not zero, as some non-smokers get it too). Other health risks of smoking are likewise mere chances.

To appreciate this, it is instructive to imagine that the time difference and certainty difference were reversed. If smoking invariably caused immediate lung cancer but produced only a tiny increase in the chance of feeling pleasure after a multi-year delay, no one would smoke. But the immediacy and certainty of the rewards of smoking, combined with the delayed and uncertain nature of the costs, enable it to appeal to people far more than seems rational by an enlightened, dispassionate analysis. That is why even people who have been fully apprised of the risks of smoking will take up smoking and continue to smoke anyway. Still, note that this is making use of what agency, the basic animal foundation of free will, evolved to do: to make sure you got the pleasures and satisfactions that were signals of success at survival and reproduction.

The argument that smoking must be involuntary because no one would choose something that can kill them is based on a false model of rationality. Nobody makes a single choice to smoke 3 packs a day for 40 years. Choices to smoke are made one cigarette at a time, and then vaguely in terms of packs. The increase in odds of death from any one cigarette is negligible, whereas the pleasure is a quick and sure thing. The decision to take a sure pleasure in exchange for a negligible risk is eminently rational (Ainslie, 2001). That, in a sense, is the tragic flaw that makes the rational free agent vulnerable to addiction.

## 5. Discussion and conclusions

The degree to which smoking remains under voluntary control has been debated, and expert opinion continues to evolve. There seems to be at present no serious debate about whether smoking is addictive; it is. But the implications of addiction for the voluntary control of behavior have been disputed. Views can be sorted into three possible positions: Addiction prevents free will and voluntary behavior; addictive behavior remains fully controlled and voluntary; or some mixture (partial control). Addicts, some parts of the general public, and for-pay practitioners favor the first (no control) opinion, though possibly for self-serving reasons. Researchers and unpaid practitioners seem divided between the second two (full or partial control) positions. The multiple lines of evidence reviewed herein generally favor the full or partial control positions.

### 5.1. Summary of main findings

Multiple areas of evidence were reviewed in connection with the question of whether addiction to smoking entails loss of free will. In general, the evidence points to the conclusion that smokers retain free will in the sense of voluntary control over their behavior, including autonomy and responsibility. Addiction changes patterns of motivation, but these do not alter control over behavior, or at most they do so indirectly.

Using the main operative definitions of voluntary behavior, smoking is certainly voluntary behavior. It uses voluntary muscles and exhibits various other signs of voluntary behavior. These include the facts that smoking is typically planned and intentional, that smokers adjust to rules and norms, that they increase or decrease smoking depending on price and other factors, and that they can adjust their behavior willfully during the act of smoking. Evidence fits the view that the desire (or even mere impulse) to smoke often arises involuntarily, but the behavior is voluntary and under conscious control.

An inability to quit smoking would be one sign that addiction weakens free will, but abundant evidence establishes that most people can quit smoking. Most Americans who have ever smoked have quit. Many quit permanently. Others quit and then relapse, often repeatedly. Nearly all modern smokers abstain periodically based on external rules. The fact that people quit and then relapse is sometimes regarded as

indicating lack of control, but in fact it indicates that people do have the ability to quit. Most successful quitting occurs outside of professional treatment programs, and findings based on clients of these professional treatment programs have been criticized as atypical and misleading.

Most smokers can and do quit. Research efforts to prove the existence of an incorrigible minority of hardcore addicts have repeatedly failed. For example, old, heavy smokers, who seemingly would be leading candidates for incorrigible smokers, in fact show high quit rates. Research on the “hardening of the target” hypothesis (i.e., that the remaining smokers are less able to quit than previous generations) has mostly failed to support that view. Smokers do differ as to how difficult they find quitting. Some find it easy, and others find it quite difficult. The idea that there exists a small, atypical minority for whom quitting is genuinely impossible would be difficult to prove or disprove, and therefore remains plausible (though lacking evidence). In a similar vein, the notion that there are circumstances or subjective conditions that make resistance impossible is difficult to prove or disprove. There is no evidence that people reach the state of complete loss of free will, although clearly people report that their resistance to smoking urges is stronger sometimes than other times. In short, difficulty of quitting varies both within and between persons, but there is no sign that it ever becomes truly impossible.

Tobacco addiction could be said to invalidate free will insofar as urges to smoke become irresistible. However, smokers tend to rate their urges as weak rather than irresistible (indeed, as weaker than most other everyday desires). Even the occasional urge described as “irresistibly strong” is often successfully resisted, suggesting that the term “irresistible” is often used in a metaphoric rather than literal sense. Cravings also seem to diminish rather than increase when one quits, and they diminish further as weeks go by. Relapse seems to increase based on frequency of mild to moderate urges, rather than the smoker becoming overwhelmed by irresistible ones.

The fact that some people do not quit was considered, but it is hardly sufficient to establish loss of free will, especially given that people who want to quit generally do so. Many smokers keep smoking because they overestimate the difficulty of quitting or simply because they enjoy smoking. Giving up the pleasure of smoking and exerting the willpower needed to resist the tempting urges to smoke are apparently not worth the effort for many people. One might ask why they do not consider the health risks sufficient reason to quit, but people do many things that involve health risks, especially when these bring pleasure, including engaging in unprotected sex, riding motorcycles, consuming alcohol and recreational drugs, climbing mountains, playing football, sunbathing, and hunting. Many well-documented self-defeating patterns involve short-term gains coupled with delayed or probabilistic costs, and smoking fits that pattern. Compounding the disregard for risks that present as slight probabilities in the distant future, smokers seem to dismiss and devalue the future more than other people.

Thus, abundant signs indicate that addicts retain free will in terms of control over their behavior, which remains voluntary. The evidence for loss of free will is scattered and subject to alternative explanations. The two most compelling pieces of evidence for loss of free will are as follows. First, addicts favor the view that addiction entails loss of free will — but such views are self-serving insofar as they divest addicts of responsibility for their actions, so they may be merely rationalizations. Second, many addicts resolve to quit but either fail or resume after a period of abstinence — but these could represent free choices rather than determined, unfree responses. Quitting for a time and then resuming is difficult to reconcile with the view that addiction entails loss of free will, because it would require the person to be free enough to quit temporarily but not permanently. Thus the damage addiction ostensibly does to free will would have to be construed as only operating on longer time frames, not immediate or direct control of action.

Addiction is a genuine problem, for individuals and society. Although the metaphor of “brain disease” destroying free will is of questionable

usefulness, it seems clear that the brain and mind change during the process of becoming addicted, and understanding these changes would be useful to researchers, theorists, clinicians, and addicts themselves. Based on the findings reviewed herein, the metaphor of loss of free will is not a promising avenue to advance such understanding.

## 5.2. Implications for addiction theory

Researchers and treatment providers typically focus on reasons to quit, but smokers themselves are often attuned to the rewards of smoking. For a time, the view prevailed that once smokers became addicted, they were trapped by fear of withdrawal, and they continued to smoke simply because of that fear. That view is no longer tenable and has forced the research community to acknowledge the pleasures and attractions of smoking. Withdrawal from smoking seems to create a rather unpleasant month, after which most of the symptoms of withdrawal are either vastly diminished or gone altogether. Despite that, some smokers resume smoking, presumably because they want the pleasure it gives. A related development has been the abandonment of the once influential view that smoking is motivated entirely by the craving for nicotine. Maintaining certain levels of nicotine in the blood is one among several reasons for smoking, but nicotine replacement therapy has not lived up to its promise of enabling nearly all smokers to quit smoking by enabling them to maintain blood nicotine levels without smoking.

It appears that most smokers could quit but are not sufficiently motivated to do so. The desire to quit must be strong enough to overcome the recurrent desire for the pleasure of smoking and the craving for nicotine. People quit when the desire to quit becomes strong enough, such as when family pressures, health issues, financial incentives, or other personal concerns generate a sufficiently strong motivation.

The evidence reviewed here seems most compatible with the conclusion that addiction entails recurrent involuntary desire, while behavior remains under voluntary control. Addicts are not free to choose whether to want tobacco. Indeed, addiction seems to entail frequent, typically unpleasant, and possibly unwelcome desires. But the addicted person retains the ability to decide whether to act on those desires or not. In a way, this harks back to the original definition of addiction as coming to like and want something very much.

The personal tragedy of addiction may be that by becoming addicted, the person sets him or herself up for a future involving frequent subjective desires and impulses that must be denied. Becoming addicted is like buying a lottery ticket with a cruel downside. On the upside, if you are able to continue enjoying this pleasure forever, without problems, then it will enrich your life immeasurably, possibly (as with cigarettes) offering you an extra wealth of happy moments all day every day. But if you cannot make it work forever and must therefore break it off, you condemn yourself to the low-grade hell of frequently feeling that you want something you cannot have. Smoking addiction is not loss of free will in the face of an overwhelming craving or impossibility of resisting. Rather, it is an abundance of momentary disappointments. At some point, perhaps, the addict thinks, “Why can’t I just have the simple pleasure of a cigarette?” And each lapse reminds the smoker of the pleasure, thereby promoting relapse.

Addiction is perhaps not a loss of free will so much as a matter of training one’s brain to want something frequently and regularly. In a sense, its motivational trajectory resembles that of unrequited love (Baumeister, Wotman, & Stillwell, 1993; see Peele & Brodsky, 1975, for classic articulation of the view of love as addiction). Loving someone is fine, indeed deeply and euphorically satisfying — as long as the feeling is mutual and the realization is compatible with the rest of life. But the same longings become acutely painful when the love is doomed and its impulses must be resisted. The rejected lover must somehow reconcile the fact of continued wishing and longing with the reality that the blissful union will not take place.

As Peele and Brodsky (1975) anticipated, the addictive satisfactions of love are compelling, indeed presumably more satisfying than an incipient cigarette addiction. And the withdrawal is often far worse. But the rejected lover can and usually does resolve the problem by finding a new lover (Baumeister & Wotman, 1992), whereas the reformed nicotine addict must forever do without. Many people react initially to broken hearts with the assumption that they will never find romantic happiness, but in fact they usually do find someone else. Were they to face the contingencies of the smoking quitter, that they could never enjoy that kind of satisfaction again, their suffering would be even considerably greater.

Flawed forecasting, including beliefs that resistance is futile, may contribute to failures. Many smokers imagine that their cravings are likely to intensify across periods of abstinence, and so they relapse, not because they are overwhelmed, but because they expect to be overwhelmed eventually. In that case, it becomes somewhat rational to give in early. After all, if the endpoint will be the same, why suffer first? Giving in resembles capitulating to one’s torturers before the torture commences, simply because one knows that one will capitulate in the end. Smokers are generally mistaken, however, about the expectation that the cravings will mount up steadily until they become irresistible. In that respect addicted smokers are presumably unlike the torture victims. It is however quite unclear whether the addicts’ mistake is an honest one, fueled possibly by mistaken extrapolations and media portrayals — or, instead, is a form of self-deceptive rationalization.

The general failure of people to quit successfully and permanently, despite their expressed wish to do so, is the strongest argument for loss of free will in addiction. It needs to be taken seriously. If the addict truly wishes to quit smoking yet repeatedly fails to sustain abstinence, what can we conclude? Certainly there is an objective sense in which that counts as failure of free will. Yet the behavior of smoking is never truly involuntary. In the moment, the smoker does exercise free will, such as by purchasing cigarettes and lighting up. The problem lies in the disconnect between the local exercise of free will and the more global perspective in which the person wishes to reach the future in which he or she has not smoked. Such problems are widespread in human agency, such as in financial decisions (e.g., failure to save money).

I stated at the outset that the partial control theory seems appealing as a compromise but must explain in what sense free will is retained and in what sense lost. The argument that addicts cannot control the feeling of desire is not a proper resolution to this, because hardly any impulses or desires can be made to vanish by conscious act of will. A more promising line of theorizing can build on Tiffany’s (1990, 1999) thesis that addictive indulgence does not depend on cravings. In his account, using can become a kind of habit, so that the person enters into behavioral sequences (and if necessary carries them out using voluntary muscles) prompted by external cues.

Habits can be overridden, and so the existence of a habit is not a violation of free will. Then again, executing a habit is not an act of free will either. Free will can be used to override the habitual behavior, or the person can fail to exercise free will and simply follow the habitual course. This view is akin to Libet’s (2004) veto, which asserted that free will lies in the ability to counteract an impulse (sometimes called “free won’t”). Applied to smoking, this view would assert that the addict has the freedom to resist a cigarette but often fails to exercise that freedom. This view is quite different from saying that free will is overwhelmed by irresistible urges and becomes helpless. Rather, the addict has a mild impulse to smoke and passively gives in rather than exerting the effort to resist.

Free will may be exercised in implementing a lapse and acquiescing in relapse — or the person may decline to use free will and simply allow lapse and relapse to happen. Deciding not to exercise one’s agentic freedom to override the habit can of course itself be seen as an exercise of free will, akin to deciding not to decide. The person is capable of not smoking the cigarette, so multiple options exist. But not smoking would take psychological exertion and invoke complex self-regulatory

processes, whereas just acquiescing is easier. Once the person has accepted that he or she will smoke, using voluntary processes to carry this out again exhibits free will, but to the extent these processes are simple and habitual, free will can largely stay uninvolved.

In the long run, the would-be ex-smoker may not end up where he or she wanted to be. That is experienced as a failure of free will. It is perhaps more a judgment on the outcome than the process, however (Lau, Hiemisch, & Baumeister, 2015). That is, people feel lack of freedom when they do not get the result they wanted, rather than based on features of the choice process. The next section will elaborate this.

### 5.3. Implications for theory of free will

Exploration of addiction holds promise for developing free will theory. Rather than treating free will as an exemption from causality, I have proposed that free will is simply another kind of cause (e.g., Baumeister & Monroe, 2014). Addiction is likewise a cause. But these may operate somewhat independently within the same person. Addiction appears to be a form of motivation, while free will is about control of behavior. The addict remains in control of behavior but cannot control wanting.

Theorists who wish to maintain that addiction destroys free will should address two puzzles, which are also challenges to other explanations. The first is that smokers clearly retain the ability to resist any particular cigarette but somehow not to resist all of them. Another form of this puzzle is that smokers can quit for a period of time but relapse. Loss of free will thus occurs only at a temporally integrated (macro) level despite the person retaining free will at the momentary (micro) level. The second puzzle is that many addicted smokers (and other addicts) retain the ability to function effectively in work, family life, and elsewhere, so their free will is mostly intact. How or in what sense do people lose free will in one domain but retain it in others?

As already noted, any viable theory of addiction has to explain the fact that addicts favor the metaphor of lacking free will to describe what is clearly voluntary behavior. Subjective experience might be a major contributing factor. Studies by Lau et al. (2015) found that people's reports of subjective freedom were not closely linked to the process of making voluntary choices – instead, they were linked to getting a desirable outcome with minimal effort. You feel free when things turn out the way you want. (Or, more important perhaps, you feel un-free specifically when things do not turn out the way you want.) Addicts presumably have that feeling often.

Trying to quit an addiction would fit that quite well. Even if the decisions to lapse and relapse were made by a fully, objectively free process, the addicts would end up feeling that they did not get the outcome they wanted, which was to have maintained abstinence. Hence they would rate this as lacking freedom. Still, that characterization does not require one to assume that the free control of action has been abrogated. At time 1, the person made the free decision to quit smoking, and at a later time, the person made the free decision to resume smoking – or, perhaps, made the decision not to exert free will to resist the impulse to resume smoking. Later yet, the person looks back and notes that the free decision to quit has not endured, and so the smoker is tempted to conclude that free will was lost. But in this view it was not lost; it was used inconsistently. The person made contrary decisions at different points in time.

I covered evidence about whether there are circumstances or conditions that make resistance impossible. This argument would concede that in general addiction does not destroy free will, but under certain conditions it would. One prominent model of variable free will has emerged from my own work on self-regulation and ego depletion, which holds that self-regulation depends on a supply of energy and may therefore fail when that energy is low. Recent developments in that line of work have suggested that the willpower resource is not truly exhausted – rather, people cease expending it in order to conserve what remains, just as with physical energy (Baumeister & Vohs, 2016;

Beedie & Lane, 2012; Evans, Bogggero, & Segerstrom, 2015). Hence they can still exert self-control when sufficiently motivated to do so (Muraven, Shmueli, & Burkley, 2006).

The theoretical line between being unable to restrain oneself and simply choosing not to restrain oneself is unfortunately fuzzy. In simple terms, it is the distinction between can't and won't. A smoker who is unable to resist has lost free will, but the one who could resist and simply chooses to smoke retains it. The strength model of self-control complicates this in several ways. Ego depletion is understood as reduced capacity, which it is insofar as the brain's fuel for self-regulation is temporarily diminished. But it is conserving what remains rather than being incapacitated by complete lack of fuel, so it could continue to exert self-control, if it were sufficiently motivated to do so. Crucially, resisting one impulse after another may deplete the ex-smoker's willpower resource, which causes the brain automatically to seek to conserve (but could be overridden). This may especially occur when willpower resources are depleted for other reasons, such as work stress. Moreover, the fact that exerting free will takes effort could explain why smokers sometimes acquiesce in letting the habit of smoking resume. "I could resist, but I don't want to put forth the effort."

### 5.4. Some issues for further research

I suggested that one theoretical problem regarding free will and smoking is the disconnect between the local and global (macro/micro) perspectives. Addicts want the cigarette now and fail to respect the fact that tomorrow or next year they will want to not have smoked today. Thus, addictive relapse is a matter of acquiescing in losing control, by means of failing to incorporate the long-range perspective into the momentary cause of behavior. Further work might inform both addiction and free will theories by illuminating how at the crucial moment the addict disregards the long-term perspective and decides based on the immediate desire to smoke.

More generally, the addict's failure to think about the future and/or to value it deserves further study. Is the lack of future orientation a predisposing factor that contributes to starting to smoke and/or becoming addicted? Or, alternatively, is it a defensive response by which smokers conveniently ignore the long-term costs of smoking so they can enjoy the present without worry and guilt? In a similar vein, smokers seem to have the false belief that quitting will be difficult, partly because their cravings will grow stronger and stronger until they become torturously irresistible. It would again be useful to know whether this (false) belief is an honest mistake or a defensive rationalization.

A last and pressing issue concerns whether free will beliefs could improve success rates at quitting. Recent publicity has treated addiction as a brain disease, which encourages addicts to think they are helpless victims. Future work might profitably try the opposite tack, namely developing interventions aimed at bolstering belief in free will. Recent findings indicating the usefulness of such beliefs for facilitating control and helping people resist the deleterious effects of ego depletion (see Job, Dweck, & Walton, 2010; Vohs, Baumeister, & Schmeichel, 2013) is encouraging with respect to the potential efficacy of such an approach.

### 5.5. Concluding remarks

Becoming addicted to smoking means learning to want the pleasure of smoking. Desires to smoke are frequent and weak, and they are somewhat pleasant while one continues smoking. However, if the person wants to quit, the desires continue, mostly becoming even milder and perhaps less frequent, but also becoming unpleasant (Sayette & Hufford, 1995). The would-be quitter must therefore endure a long series of unpleasant moments of having to resist cravings. Many succumb at some point to a lapse, and lapses revive the pleasure, contributing to relapse. At this point, after relapsing to smoking the same amount as before the quit attempt, many smokers may have the feeling of lacking free will, because they find that they have not reached the goal they had previously



chosen (of sustained abstinence). This is a tragic drama of motivation and misguided choice, but it is not an absence of free will. Rather, the addiction nudges people to use their free will to pursue the short-term satisfactions rather than the long-term goal of abstinence.

In short, being a smoker and even being addicted to tobacco do not remove the person's free will. Addiction involves the discovery of a source of pleasure and the resulting pattern of wanting that pleasure often. The addict is probably unable to stop wanting to smoke, but whether the smoker acts on those desires remains under voluntary control. Indeed, the difference between the two main schools of thought noted above (i.e., full versus partial control) may be more apparent than real, because probably both sides agree that desires cannot be controlled but behaviors remain fully controllable. The partial control theory may also invoke habitual responses. The person can overcome a habitual response but if the person does not exert the (free) effort to do so, the habit will prevail. Thus, some addictive smoking falls into the category of passive acquiescence.

Smoking is thus a voluntary response to an involuntary desire — or, in some cases, a matter of neglecting to use voluntary efforts to counteract an impulse. In that respect it resembles a great many other human behaviors.

## References

- Ainslie, G. (2001). *Breakdown of will*. New York: Cambridge University Press.
- Alexander, B. K., Coombs, R. B., & Hadaway, P. F. (1978). The effect of housing and gender on morphine self-administration in rats. *Psychopharmacology*, *58*, 175–179.
- Alexander, B. K., Hadaway, P. F., & Coombs, R. B. (1980). The Rat Park chronicle. *British Columbia Medical Journal*, *22*, 54–56.
- American Cancer Society (1986). *Cancer facts and figures*. New York: American Cancer Society.
- Baars, B. J. (1993). Why volition is a foundation problem for psychology. *Consciousness and Cognition*, *2*, 281–309.
- Bargh, J. A. (2008). Free will is unnatural. In J. Baer, J. Kaufman, & R. Baumeister (Eds.), *Are we free? Psychology and free will* (pp. 128–154). New York: Oxford.
- Barlow, P., McKee, M., Reeves, A., Galea, G., & Stuckler, D. (2016). Time-discounting and tobacco smoking: A systematic review and network analysis. *International Journal of Epidemiology* doi: 1093/ije/dyw233. (online publication).
- Baumeister, R. F. (1997). Esteem threat, self-regulatory breakdown, and emotional distress as factors in self-defeating behavior. *Review of General Psychology*, *1*, 145–174. <http://dx.doi.org/10.1037/1089-2680.1.2.145>.
- Baumeister, R. F. (2002). Ego depletion and self-control failure: An energy model of the self's executive function. *Self and Identity*, *1*, 129–136. <http://dx.doi.org/10.1080/152988602317319302>.
- Baumeister, R. F. (2003). Ego depletion and self-regulation failure: A resource model of self-control. *Alcoholism: Clinical and Experimental Research*, *27*, 281–284. <http://dx.doi.org/10.1097/01.ALC.0000060879.61384.A4>.
- Baumeister, R. F. (2005). *The cultural animal: Human nature, meaning, and social life*. New York: Oxford University Press.
- Baumeister, R. F. (2008). Free will in scientific psychology. *Perspectives on Psychological Science*, *3*, 14–19. <http://dx.doi.org/10.1111/j.1745-6916.2008.00057.x>.
- Baumeister, R. F. (2014). Constructing a scientific theory of free will. In W. Sinnott-Armstrong (Ed.), *Moral psychology (Vol. 4): Free will and responsibility* (pp. 235–255). Cambridge, MA: MIT Press.
- Baumeister, R. F., & Monroe, A. E. (2014). Recent research on free will: Conceptualizations, beliefs, and processes. *Advances in Experimental Social Psychology*, *50*, 1–52. <http://dx.doi.org/10.1016/B978-0-12-800284-1.00001-1>.
- Baumeister, R. F., & Scher, S. J. (1988). Self-defeating behavior patterns among normal individuals: Review and analysis of common self-destructive tendencies. *Psychological Bulletin*, *104*, 3–22. <http://dx.doi.org/10.1037/0033-2909.104.1.3>.
- Baumeister, R. F., & Vohs, K. D. (2016). Strength model of self-regulation as limited resource: Assessment, controversies, update. *Advances in Experimental Social Psychology*, *54*, 67–127. <http://dx.doi.org/10.1016/bs.aesp.2016.04.001>.
- Baumeister, R. F., & Votman, R. S. (1992). *Breaking hearts: The two sides of unrequited love*. New York: Guilford.
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.
- Baumeister, R. F., Masicampo, E. J., & Vohs, K. D. (2011). Do conscious thoughts cause behavior? *Annual Review of Psychology*, *62*, 331–361. <http://dx.doi.org/10.1146/annurev.psych.093008.131126>.
- Baumeister, R. F., & Votman, A. J. (2015). Uses of self-regulation to facilitate and restrain addictive behavior. *Addictive Behaviors*, *44*, 3–8. <http://dx.doi.org/10.1016/j.addbeh.2014.09.011>.
- Baumeister, R. F., Votman, S. R., & Stillwell, A. M. (1993). Unrequited love: On heartbreak, anger, guilt, scriptlessness, and humiliation. *Journal of Personality and Social Psychology*, *64*, 377–394. <http://dx.doi.org/10.1037/0022-3514.64.3.377>.
- Beedie, C. J., & Lane, A. M. (2012). The role of glucose in self-control: Another look at the evidence and an alternative conceptualization. *Personality and Social Psychology Review*, *16*, 143–153. <http://dx.doi.org/10.1177/1088868311419817>.
- Berglas, S. C., & Baumeister, R. F. (1993). *Your own worst enemy: Understanding the paradox of self-defeating behavior*. New York: Basic Books.
- Bickel, W. K., Odum, A. L., & Madden, G. J. (1999). Impulsivity and cigarette smoking: Delay discounting in current, never, and ex-smokers. *Psychopharmacology*, *146*(4), 447–454.
- Burns, D. M. (2003). The case against hardening of the target. In R. Amacher, & S. Marcus (Eds.), *Those who continue to smoke (NCI monograph 15)* (pp. 41–48). Washington, DC: National Cancer Institute, Department of Health and Human Services.
- Burns, D. M., & Warner, K. E. (2003). Smokers who have not quit: Is cessation more difficult and should we change our strategies? In R. Amacher, & S. Marcus (Eds.), *Those who continue to smoke (NCI monograph 15)* (pp. 11–32). Washington, DC: National Cancer Institute, Department of Health and Human Services.
- Centers for Disease Control and Prevention (CDC) (1999). Tobacco use—United States, 1900–1999. *Morbidity and Mortality Weekly Report*, *48*(43), 986–993.
- Chapman, S. (2009). The inverse impact law of smoking cessation. *Lancet*, *373*, 701–703.
- Chapman, S., & MacKenzie, R. (2010). The global research neglect of unassisted smoking cessation: Causes and consequences. *PLoS Medicine*, *7*, e1000216. <http://dx.doi.org/10.1371/journal.pmed.1000216>.
- Charland, L. C. (2011). Decision-making capacity and responsibility in addiction. In J. Poland, & G. Graham (Eds.), *Addiction and responsibility* (pp. 139–158). Cambridge, MA: MIT Press.
- Christakis, N. A., & Fowler, J. H. (2008). The collective dynamics of smoking in a large social network. *New England Journal of Medicine*, *358*(21), 2249–2258.
- Coombs, R. B., Li, S., & Kozlowski, L. T. (1992). Age interacts with heaviness of smoking in predicting success in cessation of smoking. *American Journal of Epidemiology*, *135*(3), 240–246.
- Dar, R., Rosen-Korakin, N., Shapira, O., Gottlieb, Y., & Frenk, H. (2010). The craving to smoke in flight attendants: Relations with smoking deprivation, anticipation of smoking, and actual smoking. *Journal of Abnormal Psychology*, *119*, 248–253.
- Dar, R., Stronguin, F., Marouani, R., Krupsky, M., & Frenk, H. (2005). Craving to smoke in orthodox Jewish smokers who abstain on the Sabbath: A comparison to a baseline and a forced abstinence workday. *Psychopharmacology*, *183*, 294–299.
- Davies, J. B. (1997). *The myth of addiction*. London, England: Routledge.
- Dennett, D. C. (2003). *Freedom evolves*. New York: Viking/Penguin.
- Evans, D. R., Boggero, I. A., & Segerstrom, S. C. (2015). The nature of self-regulatory fatigue and “ego depletion” lessons from physical fatigue. *Personality and Social Psychology Review*, *1088868315597841*. <http://dx.doi.org/10.1177/1088868315597841> (first published on July 30, 2015).
- Fidler, J. A., & West, R. (2009). Self-perceived smoking motives and their correlates in a general population sample. *Nicotine & Tobacco Research*, *11*(10), 1182–1188.
- Foddy, B., & Savulescu, J. (2006). Addiction and autonomy: Can addicted people consent to the prescription of their drug of addiction? *Bioethics*, *20*, 1–15.
- Gwaltney, C. J., Shiffman, S., & Sayette, M. A. (2005). Situational correlates of abstinence self-efficacy. *Journal of Abnormal Psychology*, *114*(4), 649–660.
- Gwaltney, C. J., Shiffman, S., Balabanis, M. H., & Paty, J. A. (2005). Dynamic self-efficacy and outcome expectancies: Prediction of smoking lapse and relapse. *Journal of Abnormal Psychology*, *114*(4), 661–675.
- Haggard, P., Mele, A., O'Connor, T., & Vohs, K. D. (2010). Lexicon of key terms. Big questions in free will. Published online at [www.freewillandscience.com/wp/?page\\_id=63](http://www.freewillandscience.com/wp/?page_id=63)
- Heyman, G. M. (2009). *Addiction: A disorder of choice*. Cambridge, MA: Harvard.
- Hofmann, W., Baumeister, R. F., Förster, G., & Vohs, K. D. (2012). Everyday temptations: An experience sampling study of desire, conflict, and self-control. *Journal of Personality and Social Psychology*, *102*(6), 1318–1335. <http://dx.doi.org/10.1037/a0026545>.
- Hughes, J. R. (1992). Tobacco withdrawal in self-quitters. *Journal of Consulting and Clinical Psychology*, *60*, 689–697.
- Hughes, J. R., & Burns, D. M. (2003). The case for hardening of the target. In R. Amacher, & S. Marcus (Eds.), *Those who continue to smoke (NCI monograph 15)* (pp. 33–40). Washington, DC: National Cancer Institute, Department of Health and Human Services.
- Irvin, J. E., & Brandon, T. H. (2003). Examining a quarter-century of smoking cessation trials: Is the target becoming harder to treat? In R. Amacher, & S. Marcus (Eds.), *Those who continue to smoke (NCI monograph 15)* (pp. 49–60). Washington, DC: National Cancer Institute, Department of Health and Human Services.
- Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego depletion—Is it all in your head? Implicit theories about willpower affect self-regulation. *Psychological Science*, *21*, 1686–1693. <http://dx.doi.org/10.1177/0956797610384745>.
- Lau, S., Hiemisch, A., & Baumeister, R. F. (2015). The experience of freedom in decisions—Questioning philosophical beliefs in favor of psychological determinants. *Consciousness and Cognition*, *33*, 30–46.
- Leshner, A. I. (1997). Addiction is a brain disease, and it matters. *Science*, *278*, 45–47.
- Lewis, M. (2016). *The addiction habit*. <https://aeon.co/essays/why-its-high-time-that-attitudes-to-addiction-changed>.
- Libet, B. (2004). *Mind time: The temporal factor in consciousness*. Cambridge, MA: Harvard University Press.
- Mele, A. R. (2006). *Free will and luck*. Oxford: New York.
- Menninger, K. (1938). *Man against himself*. New York: Harcourt.
- Monroe, A. E., & Malle, B. F. (2010). From uncaused will to conscious choice: The need to study, not speculate about people's folk concept of free will. *Review of Philosophy and Psychology*, *1*(2), 211–224.
- Montague, P. R. (2008). Free will. *Current Biology*, *18*, R584–R585.
- Morsella, E. (2005). The function of phenomenal states: Supramodular interaction theory. *Psychological Review*, *112*, 1000–1021.
- Muraven, M., Shmueli, D., & Burkley, E. (2006). Conserving self-control strength. *Journal of Personality and Social Psychology*, *91*(3), 524–537.

- Niaura, R. S., Rohsenow, D. J., Binkoff, J. A., Monti, P. M., Pedraza, M., & Abrams, D. B. (1988). Relevance of cue reactivity to understanding alcohol and smoking relapse. *Journal of Abnormal Psychology, 97*(2), 133–152.
- Nordgren, L., van Harreveld, F., & van der Pligt, J. (2009). The restraint bias: How the illusion of self-restraint promotes impulsive behavior. *Psychological Science, 20*, 1523–1528.
- Orford, J. (2001). Conceptualizing addiction: Addiction as excessive appetite. *Addiction, 96*, 15–31.
- Peele, S. (1989). *The diseasing of America*. Boston, MA: Houghton Mifflin Co.
- Peele, S. (1998). *The meaning of addiction: An unconventional view*. San Francisco: Jossey-Bass.
- Peele, S., & Brodsky, A. (1975). *Love and addiction*. New York: Taplinger.
- Piasecki, T. M., Jorenby, D. E., Smith, S. S., Fiore, M. C., & Baker, T. B. (2003). Smoking withdrawal dynamics: I. Abstinence distress in lapsers and abstainers. *Journal of Abnormal Psychology, 112*(1), 3–13.
- Piasecki, T. M., Niaura, R., Shadel, W. G., Abrams, D., Goldstein, M., Fiore, M. C., & Baker, T. B. (2000). Smoking withdrawal dynamics in unaided quitters. *Journal of Abnormal Psychology, 109*(1), 74–86.
- Poland, J., & Graham, G. (Eds.). (2011). *Addiction and responsibility*. Cambridge, MA: MIT Press.
- Potenza, M. N., Sofuoglu, M., Carroll, K. M., & Rounsaville, B. J. (2011). Neuroscience of behavioral and pharmacological treatments for addictions. *Neuron, 69*, 695–712.
- Redish, A. D., Jensen, S., & Johnson, A. (2008). A unified framework for addiction: Vulnerabilities in the decision process. *Behavioral and Brain Sciences, 31*, 415–487.
- Robins, L. N., Helzer, J. E., & Davis, D. H. (1975). Narcotic use in Southeast Asia and afterward: An interview study of 898 Vietnam returnees. *Archives of General Psychiatry, 32*, 955–961.
- Rose, J. E. (2006). Nicotine and nonnicotine factors in cigarette addiction. *Psychopharmacology, 184*(3–4), 274–285.
- Royal Society of Canada (1989). *Tobacco, nicotine, and addiction*. Ottawa, Ontario, Canada: Author.
- Russell, C., & Davies, J. B. (2009). Empirical, logical and philosophical arguments against cigarette smoking as a pharmacologically compelled act. *Current Psychology, 28*(3), 147–168.
- Russell, C., Davies, J. B., & Hunger, S. C. (2011). Predictors of addiction treatment providers' beliefs in the disease and choice models of addiction. *Journal of Substance Abuse Treatment, 40*, 150–164.
- Sayette, M. A., & Hufford, M. R. (1995). Urge and affect: A facial coding analysis of smokers. *Experimental and Clinical Psychopharmacology, 3*(4), 417–423.
- Sayette, M. A., Loewenstein, G., Kirchner, T. R., & Travis, T. (2005). Effects of smoking urge on temporal cognition. *Psychology of Addictive Behaviors, 19*(1), 88–93.
- Sayette, M. A., Wertz, J. M., Martin, C. S., Cohn, J. F., Perrott, M. A., & Hobe, J. (2003). Effects of smoking opportunity on cue-elicited urge: A facial coding analysis. *Experimental and Clinical Psychopharmacology, 11*(3), 218–227.
- Schachter, S. (1982). Recidivism and self-cure of smoking and obesity. *American Psychologist, 37*(4), 436–444.
- Schaler, J. A. (2000). *Addiction is a choice*. Chicago, IL: Open Court/Carus.
- Secades-villa, R., Weidberg, S., Garcia-Rodriguez, O., Fernandez-hermidia, J. R., & Ho, J. (2014). Decreased delay discounting in former cigarette smokers at one year after treatment. *Addictive Behaviors, 39*, 1087–1093.
- Shadel, W. G., & Mermelstein, R. J. (1993). Cigarette smoking under stress: The role of coping expectancies among smokers in a clinic-based smoking cessation program. *Health Psychology, 12*(6), 443–450.
- Shadel, W. G., Martino, S. C., Setodji, C., Cervone, D., Witkiewitz, K., Beckjord, E. B., ... Shih, R. (2011). Lapse-induced surges in craving influence relapse in adult smokers: An experimental investigation. *Health Psychology, 30*(5), 588–596.
- Shepherd, J. (2012). Free will and consciousness: Experimental studies. *Consciousness and Cognition, 21*, 915–927.
- Shiffman, S., Engberg, J. B., Paty, J. A., Perz, W. G., Gnys, M., Kassel, J. D., & Hickcox, M. (1997). A day at a time: Predicting smoking lapse from daily urge. *Journal of Abnormal Psychology, 106*(1), 104–116.
- Shiffman, S., Gwaltney, C. J., Balabanis, M. H., Liu, K. S., Paty, J. A., Kassel, J. D., ... Gnys, M. (2002). Immediate antecedents of cigarette smoking: An analysis from ecological momentary assessment. *Journal of Abnormal Psychology, 111*(4), 531–545.
- Stillman, T. F., Baumeister, R. F., & Mele, A. R. (2011). Free will in everyday life: Autobiographical accounts of free and unfree actions. *Philosophical Psychology, 24*(3), 381–394.
- Strong, D. R., Leventhal, A. M., Evatt, D. P., Haber, S., Greenberg, B. D., Abrams, D., & Niaura, R. (2011). Positive reactions to tobacco predict relapse after cessation. *Journal of Abnormal Psychology, 120*(4), 999–1005. <http://dx.doi.org/10.1037/a0023666>.
- Suddendorf, T. (2013). *The gap: The science of what separates us from other animals*. New York: Basic Books.
- Tiffany, S. T. (1990). A cognitive model of drug urges and drug-use behavior: Role of automatic and nonautomatic processes. *Psychological Review, 97*, 147–168.
- Tiffany, S. T. (1999). Cognitive concepts of craving. *Alcohol Research & Health, 23*, 215–224.
- Tomasello, M. (1999). *The cultural origins of human cognition*. Cambridge, MA: Harvard.
- Tomasello, M. (2014). *The natural history of human thinking*. Cambridge, MA: Harvard.
- Tomasello, M. (2016). *A natural history of human morality*. Harvard University Press.
- U.S. Department of health and Human Services (1988). *The health consequences of smoking: A report of the surgeon general: Nicotine addiction*. Washington, DC: Author.
- U.S. Department of Health and Human Services (2003). *Those who continue to smoke. Smoking and tobacco control monograph 15*. Washington, DC: Author.
- Vohs, K. D., Baumeister, R. F., & Schmeichel, B. J. (2013). Motivation, personal beliefs, and limited resources all contribute to self-control. *Journal of Experimental Social Psychology, 49*, 184–188. <http://dx.doi.org/10.1016/j.jesp.2012.08.007>.
- Volkow, N. (2015, June 12). Addiction is a disease of free will. [Web log post]. Retrieved from <https://www.drugabuse.gov/about-nida/noras-blog/2015/06/addiction-disease-free-will>
- Volpp, K. G., Troxel, A. B., Pauly, M. V., Glick, H. A., Puig, A., Asch, D. A., ... Audrain-McGovern, J. (2009). A randomized, controlled trial of financial incentives for smoking cessation. *New England Journal of Medicine, 360*, 699–709.
- Vonasch, A. J., Clark, C. J., Lau, S., Vohs, K. D., & Baumeister, R. F. (2017). Ordinary people associate addiction with loss of free will. *Addictive Behaviors Reports, 5*, 56–66 (this issue).
- Wertz, J. M., & Sayette, M. A. (2001a). A review of the effects of perceived drug use opportunity on self-reported urge. *Experimental and Clinical Psychopharmacology, 9*(1), 3–13.
- Wertz, J. M., & Sayette, M. A. (2001b). Effects of smoking opportunity on attentional bias in smokers. *Psychology of Addictive Behaviors, 15*(3), 268–271.
- Zhang, X., Cowling, D. W., & Tang, H. (2010). The impact of social norm change strategies on smokers' quitting behaviours. *Tobacco Control, 19*(Suppl. 1), i51–i55. <http://dx.doi.org/10.1136/tc.2008.029447>.