Uses of self-regulation to facilitate and restrain addictive behavior

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HIGHLIGHTS

• Role of conscious control changes across stages of addiction.
• Self-regulation is used both for promoting and resisting addictive behaviors.
• Self-regulation helps maintain regular usage despite situational obstacles.
• Willpower fluctuates, and depleted willpower reduces control.

ABSTRACT

We apply self-regulation theory to understand addictive behavior. Self-regulation and volition depend on a limited resource, and when that resource has been depleted, self-regulation becomes prone to fail. Moving beyond traditional models that have emphasized the relevance of self-regulation to quitting addiction, we propose that self-regulation is used both to facilitate and resist addictive behaviors. Self-regulation is often needed to overcome initial aversion to drugs and alcohol, as well as to maintain addictive usage patterns despite situational obstacles (e.g., illegality, erratic availability, family disapproval). Sustaining addiction also requires preventing use from spiraling out of control and interfering with other aspects of life. More generally, the automaticity and irresistibility of addictive responses may have been overrated, as indicated by how addictive behaviors respond rationally to incentives and other concerns. Self-regulation does facilitate quitting, and relapse may be especially likely when self-regulatory capabilities are depleted.

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1. Introduction

Addictive behavior is today regarded by the general public and by portions of the treatment and research community as an unusual kind of motivated behavior, in which the individual is strongly attached to something harmful or undesirable and continues to use it despite mounting costs. Indeed, reigning stereotypes of addiction characterize it as marked by overwhelmingly powerful cravings that render resistance futile, even impossible. Addicts are therefore considered unable to prevent themselves from continuing to use. In this view, self-regulation operates mainly to resist the addictive cravings, and in the long run, presumably with professional help, the addict’s self-regulatory capabilities may enable him or her to break free from the addiction. Even that recovery is widely regarded as tentative at best, and great vigilance is required to guard against the ever-present possibility of a resurgence of overwhelming cravings and a resumption of the addictive behavior, with all its destructive effects.

Some features of this popular view of addiction appear correct, but others have lost plausibility in the face of accumulating evidence. This manuscript lays out an alternative and broader view of self-regulation in connection with addictive behavior. After summarizing current theory on self-regulation, we shall begin by pointing out some flaws in the reigning stereotype of addiction and suggest a revised understanding of it. Our summary of self-regulation theory offers useful suggestions on how addictive behavior can be shaped and altered by it — and why many such efforts are prone to fail.

We shall then argue that self-regulation can be used to create and sustain addictive patterns — and may be essential to doing so — just as commonly as it is used to combat and resist them. This contradicts the simple but apparently widespread assumption that self-regulation is relevant only to recovery from addiction and is therefore only employed against substance abuse. The role of self-regulation changes over the life
course of addiction, and both the addiction itself and the resistance to it make use of self-regulation. We hope that this will lead to a more balanced and integrative understanding of how self-regulation functions in addiction.

2. How self-regulation functions

Self-regulation is a process of managing and changing the self. It is often employed to alter responses, such as to change one's thoughts, emotions, impulses, or task performance behaviors from how they would unfold in the absence of top-down control (Baumeister, Heatherton, & Tice, 1994).

Self-regulatory problems often arise from inner conflict. In particular, a recovering addict may harbor desires to use and desires to abstain. Gawronski and Bodenhausen (2011) have proposed that conscious awareness. In an early and exploratory survey of multiple self-regulation techniques, participants performed worse on a second, seemingly unrelated task, as long as it too required self-regulation. Such findings supported the theory that some energy or strength was reduced during the first task, leaving the person in a state called ego depletion that led to the poor performance on the second task. Many studies have replicated ego depletion effects (for meta-analysis, see Hagger, Wood, Stiff, & Chatzisarantis, 2010), though there have been attempts to offer competing explanations for some findings (Inzlicht & Schmeichel, 2012). Several refinements to the initial theory have been necessary (see Baumeister & Vohs, submitted for publication). Depletion effects do not indicate that a resource has been exhausted, merely that partial depletion stimulates a tendency to conserve (just as with physical energy) (Muraven, Shmueli, & Burkley, 2006). Thus, when mildly depleted, the person has ample resources available and is capable of effective self-regulation but often prefers to conserve rather than expend more resources. Selective allocation rather than resource exhaustion is thus vital to understanding self-regulation (see Beedie & Lane, 2012).

The self-regulatory resource appears to be domain-general, as indicated by the dual-task design. Hence any demands on self-regulation will detract from any subsequent self-regulatory effort, at least until one recovers. There is some evidence linking the resource to glucose, a chemical in the bloodstream that supplies energy to the brain and other body parts (Gailliot & Baumeister, 2007; Gailliot et al., 2007). Glucose costs can increase vulnerability to self-regulation failure. For example, women experiencing premenstrual syndrome (PMS) typically have a shortage of glucose, because the reproductive demands of the uterine phase of the menstrual cycle consume extra glucose, leaving less for self-regulation (Gailliot, Hildebrandt, Eckel, & Baumeister, 2010). PMS has long been associated with increases in substance abuse. In fact, alcohol itself lowers blood glucose, which may contribute to its detrimental effects on self-regulation.

Other refinements include evidence that self-regulatory capability can be gradually improved over time by regular exercise, analogous to how a muscle becomes stronger (e.g., Muraven, Baumeister, & Tice, 1999). More ominously, the subjective (phenomenal) consequence of ego depletion is that all manner of feelings and desires are felt more strongly than usual (Vohs et al., 2014). Hence ego depletion poses a double risk to the recovering addict who frequently self-regulates to stifle urges to use: One's resistance is weaker than usual, and one's desire to use may feel stronger than usual. Moreover, if one does lapse and indulge, the pleasure may be felt more intensely than usual.

Although ego depletion is a major cause of self-regulation failure, there are others. Most important, when people feel bad, they give priority to feeling better quickly, and so in a sense they use their self-control to regulate feelings rather than maintain control over appetites (Tice, Bratslavsky, & Baumeister, 2001). As addictive substances generally bring immediate pleasure, use and abuse may increase when people experience stress or other distress. In this sense, taking addictive drugs may be a form of self-regulation.

3. Addiction

A full theory of addiction would be beyond the scope of this paper, but some understanding of the concept is necessary. Addiction originally meant simply strong desire for something, but more recently it has meant problematic desire. For example, Orford (2000) noted that the term has changed from referring simply to attachment: now it means conflict about attachment. The changing meanings as well as the accumulation of popular connotations may be one reason that many clinicians have begun to avoid the term.1

1 We thank an anonymous reviewer for bringing this rising avoidance to our attention.
The popular stereotype depicts addiction as consisting of overwhelming, often irresistible craving. Some experts agree, such as Lesnher (1997, 1999) who characterized addiction as a brain disease. Addicts are also fond of that view, possibly because it depicts them as victims and helps excuse their destructive and irresponsible behavior (e.g., Davies, 1997; Peele, 1989). Against that view, researchers have begun to regard it more as a pattern of dysfunctional, impulsive choices, possibly distorted by selfish, pleasure-seeking inclinations (Heyman, 2009; Redish, Jensen, & Johnson, 2008). An experience sampling study by Hofmann, Vohs, and Baumeister (2012) found that desires for tobacco and alcohol were on average weaker than all other desires and were less likely to be rated as irresistible. Thus, addictive behavior may be sustained by frequent, mild desires rather than by overwhelming urges.

We conclude that becoming addicted involves a change in desire, not in control of behavior. The brain changes associated with addiction (see Lesnher, 1997, 1999) mainly involve desire and pleasure centers rather than the motor cortex, consistent with the view that patterns of desire are altered but control over one’s behavior remains the same. Volition is not overwhelmed by addiction, but rather volition is used to decide whether to comply and satisfy or to deny and abstain.

4. Heuristic framework: phases of addiction

From a person’s first encounter with an addictive substance or activity to the last, the role of self-regulation may change repeatedly. In order to elucidate that changing role, we separate the span of addiction into heuristic stages.

The first phase is pre-addiction. The person learns about the substance and begins experimenting with it. Use may occur for a period of time before the person is genuinely addicted. This phase ends when the sporadic use crystallizes into regular use and the person begins to realize that doing without the substance does not seem to be a viable, or at least appealing, option.

Once the person becomes addicted, there may be a relatively stable period of regular use. At this point, presumably, the costs and dangers associated with addiction have not yet become apparent or at least have not begun in earnest to lower the quality of the person’s life. In some cases, this could even be close to permanent, such as when caffeine addicts maintain a stable habit of drinking a certain amount of coffee every day throughout life. This phase ends if and when the person decides that the addiction is not sustainable and it would be highly desirable to quit, or at least substantially reduce, consumption of the substance.

The third phase (if it arises) involves fighting against the addiction. It is marked by efforts to cease using. In this phase the person struggles between continuing to use and ceasing to use. There may be multiple, abortive attempts to quit, followed by lapses and relapses. The person may seek professional help or do other things to quit, but in general use continues off and on.

A fourth phase could be specified after the person has managed to quit successfully and is not using any longer. The appeal and danger of relapsing remain. For brevity’s sake, we will not discuss this phase.

5. Self-regulation during pre-addiction

One might think that self-regulation has no role during this initial stage, but that is likely wrong. That assumption of irrelevance derives from the stereotype that self-regulation is all about overcoming addiction. Rawn and Vohs (2011) observed that most addictive substances are initially unpleasant, so people must self-regulate in order to use them despite their initial aversion. Self-regulation may also be needed to overcome fears and other negative feelings connected with using addictive substances, such as may stem from the negative publicity surrounding cigarettes and illegal drugs. In terms of Gawronski and Bodenhausen’s (2011) model, the person may begin with negative associations toward the substance, such as from parental or media warnings about dangerous consequences of substance abuse. These need to be overcome by using positive propositional evaluations. For example, “I always heard that cocaine is dangerous, but now I see some of my friends use it without any bad consequences, so probably it is OK to try a little now and then.”

If the initial experience is unpleasant, the person may be even more averse to trying again, though some do. For example, if the initial experience with smoking tobacco is unpleasant, the young person is less likely to continue smoking than if the first experience is recalled as pleasant (Urbán, 2010). The fact that some people do keep trying despite initial dislike again suggests that self-regulation can be required to sustain and increase use.

A popular stereotype suggests that first exposure to addictive substances, from smoking to drugs, is a result of strong peer pressure, so self-regulation would only be used to resist that pressure, not to consume. Michell and West (1996) confirmed that media portrayals feature that sort of process, but their research found that most young people had been much more active in deciding to try their first cigarette, and young smokers generally denied that their friends had made them feel that they should smoke. To be sure, Rawn and Vohs (2011) proposed that desire to fit in and be accepted, rather than peer pressure to use, is the motivating factor. Still, this would indicate effortful self-regulation to facilitate using in service of garnering social acceptance.

Self-regulation and voluntary control are also evident in the tradeoffs people make when commencing use of addictive substances. For example, higher cigarette prices discourage youth from trying cigarettes and also reduce patterns of heavy consumption of cigarettes (Centers for Disease Control & Prevention, 1998). Thus, initial substance use is affected by monetary calculations, at least in the sense that limited funds must be allocated according to what other purchases would have to be foregone in order to purchase addictive substances.

To be sure, self-regulation may also be used to resist substance use even during this preliminary phase. Although peer pressure appears to have been overrated and overemphasized as a cause of use (Michell & West, 1996), it is not entirely irrelevant, and some studies have found that peer pressure correlates with smoking and drinking among middle-school students (Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001). High self-control has been shown to reduce children’s experimentation with alcohol (Wong et al., 2006). It is possible that temporary reductions in self-regulatory capacity, such as caused by ego depletion, would increase vulnerability to yielding to temptation or influence to use drugs, though those moments of reduced capacity would reduce experimentation with drugs under circumstances that required much volition to obtain and use.

6. Self-regulation during stable addiction

Contrary to the stereotype of addiction as a quick descent into hell, many people develop addictions and sustain them over long periods of time. Most obviously, several generations of cigarette smokers developed the addiction in young adulthood and continued smoking for decades, even until they died.

During this phase, the person is not trying to quit, and so again the simplistic view that self-regulation is just for quitting would entail that self-regulation is irrelevant to this stage. Any reluctance to begin using has presumably ended by this point, as the person knows how to enjoy the substance, so again it might seem that self-regulation is not needed. But we think self-regulation is relevant.

Multiple signs indicate the need for self-regulation and voluntary control while maintaining an addiction. With tobacco, widespread restrictions on smoking require smokers to plan strategically the times and places they will smoke. Contrary to any stereotype of the passive smoker helplessly yielding to overwhelming impulses, smokers must anticipate when they want to smoke, purchase and organize materials...
Abundant evidence indicates that smokers adjust their consumption based on external contingencies, even above and beyond the many “no smoking” rules. Supporting an addiction requires integration with other aspects of life, also involving self-regulation. A meta-analysis by Gallet and List (2003) showed that smoking responds to monetary contingencies: Raising prices by 1% reduces consumption by about 0.4%. When smokers’ income rises, they smoke more. In the modern era of widespread bans on indoor smoking, going outdoors for a smoke is more difficult and aversive in winter than summer, and smokers reduce their smoking during the cold months:Momperousse, Delneo, and Lewis (2007) found that New Jersey cigarette sales were 37% lower in frigid February than in balmy June.

Trait self-control affects smoking, and lacking self-control can make it difficult to keep addiction from becoming excessive. People with high self-control smoke less than those with low self-control (Daly, Baumeister, Delaney, & MacLachlan, 2014). Among college students, high self-regulation was associated with reduced binge drinking and fewer problems with alcohol (Quinn & Fromme, 2010). Adolescents who scored higher on temptation to drink, particularly when they were also low in cognitive self-control, had more problems with their drinking (William & Ricciardelli, 1999). Many studies have confirmed that people scoring high on temptation to drink tend to drink more—not just problem drinkers but social drinkers too (Cox et al., 2001). Muraven, Collins, and Neinhuis (2002) showed that ego depletion increased alcohol consumption among serious drinkers, even when they expected a simulated driving test afterward. Muraven, Collins, Shiffman, and Paty (2005) extended this by showing that on days when drinkers experienced more demands for self-regulation (e.g., workplace stress or family problems), they were more likely to violate their self-imposed limits on drinking than on other days. Muraven and Shmueli (2006) showed that resisting temptation requires self-control in that it causes ego depletion: Social drinkers who sniffed alcohol performed worse on subsequent lab tests of self-regulation than those who sniffed water. The implication was that the scent of alcohol gave rise to urges to drink, which they had to regulate and suppress, thereby depleting their willpower.

When the Dutch first banned smoking in the workplace, people with low self-control reduced smoking sharply, whereas those with high self-control did not change. After a couple years the difference vanished, as people with low self-control seem to have resumed smoking (Daly, Delany, & Baumeister, submitted for publication). Presumably, the workplace ban increased the difficulty and hence the need for planful self-control in order to smoke, such as to schedule cigarette breaks and identify permissible locales. Smokers with high self-control managed that (and therefore did not change their smoking habits directly in response to the new laws). In contrast, people lacking self-control bowed to the rules by simply foregoing smoking at first—but eventually they either figured out how to follow the rules and still smoke, or they copied the methods other smokers used, and this enabled them to smoke more again.

Insofar as addiction involves continuing to use despite serious risks and costs to other spheres of life, maintaining an addiction for a long period of time requires self-regulation so as to minimize such damage. Alcoholics must restrain themselves at least so that hangovers are not so frequent and debilitating as to imperil their jobs, and similar pragmatic concerns apply to heroin and cocaine users. Even the need to be able to drive a car at the end of an evening of indulgence requires some self-regulation, and although undoubtedly some people do drive drunk, others at least restrain themselves to some degree. Addictions to illegal drugs may also require self-control to sustain, as one must manage risks of prosecution as well as greater difficulties of obtaining, storing, and using the drugs. Addicts do not usually use illegal drugs in broad daylight on crowded streets, which indicates that they are able to control their impulses at least to avoid being caught by police or others who might disapprove. Addicts who conceal their use from family members and friends likewise employ considerable self-control to manage their using.

The drugs themselves may affect self-regulation. As noted above, alcohol reduces self-awareness, thereby undercutting the supervisory monitoring system that compares behavior to standards. It also lowers blood glucose, and low glucose has frequently been linked to poor self-regulation (for review, see Gailliot & Baumeister, 2007). Drinking alcohol may therefore lead to drinking more alcohol.

In contrast, smoking cigarettes may actually improve self-regulation in some circumstances. Experimental evidence by Heckman, Ditre, and Brandon (2012) showed that smoking a cigarette counteracted the behavioral effects of depletion among smokers. Many substances create positive feelings, and pleasant emotions restore self-regulatory performance during depletion (Tice, Baumeister, Shmueli, & Muraven, 2007). Even aside from any direct effect of positive emotion on depletion, the pleasant feelings from using substances may serve to counteract negative feelings. Many addicts report that they drink, smoke, or ingest their favored substance more during times of stress and other bad feelings, and such use may stem in part from a deliberate quest to feel better.

It may be common and tempting to regard increases in smoking, drinking, and drug use during times of stress or emotional distress as simply indicative of self-regulation failure. In that view, the person’s resources are depleted by the stress and so willpower to resist substance use is inadequate. This assumes, however, that the person is constantly resisting using. Against that view, one could argue that increased substance use during such periods is itself an important form of self-regulation. The person feels bad and wants to feel better—and the cigarette, martini, or drug hit may be the most reliable and promising way to bring this about quickly.

Thus, self-regulation has multiple uses during the maintenance phase of addiction. Even when self-regulation is used to restrain one’s consumption, this is in service of facilitating continued usage, by preventing the addiction from wreaking such damage as to make the addiction unsustainable. Trait and state differences in self-control predict patterns of use, especially such that low self-control leads to greater excesses and problematic usage, bringing one faster to the crisis point at which the person accepts the need to curtail usage.

7. Self-regulation during the struggle to quit

Up till now, self-regulation has been more to facilitate using than to resist and reduce it. At some point that changes. No doubt quitting requires more heroic and difficult feats of self-control than continuing to use, hence the image of addiction as so persistent and recalcitrant. Self-regulation during the earlier phases took on tasks at which it could succeed. Quitting an addiction places heavy demands on self-regulation, so failure becomes increasingly likely.

Successful abstinence requires self-control, almost by definition. Muraven (2010) showed that improving self-control strength by performing daily exercises of self-regulation led to substantial improvements in success at quitting smoking.

In terms of the automatic and propositional evaluation theory of Gawronski and Bodenhausen (2011), the job of self-regulation here is the opposite of what occurred during the first stage. By this point the positive associations for using the drug have become automatic and well entrenched. The deliberate, propositional attitude that continued use will be disastrous must guide self-regulation to change behavior away from continued use. When top-down control is weak, as during ego depletion, automatic associations may guide behavior, thereby increasing the chances of lapse and relapse.

Compliance with treatment regimens requires self-regulation and voluntary control—but in some cases, so does lapsing. Disulfiram (also known as Antabuse) is a chemical that discourages drinking by adding unpleasant side effects: People who consume disulfiram and
then drink alcohol feel sick, thus spoiling the pleasure. Regular doses effectively reduce drinking, presumably because the pleasure of intoxication is replaced by feeling bad (e.g., Fuller et al., 1986). Thus, alcoholics who continue to take disulfiram tend to refrain from drinking, but many alcoholics discontinue using it (Brewer, Meyers, & Johnsen, 2000). One common reason for discontinuing to take disulfiram is that the alcoholic wishes to resume drinking (and enjoying it) (Liskow, Nickel, Tunley, Powell, & Penick, 1990). Such premeditated relapse is especially noteworthy as evidence of intentional control, because it takes up to a week for the disulfiram to leave the body so that alcohol can be pleasant. Thus, many alcoholics plan their lapses several days in advance, demonstrating foresight, intention, and planning.

We think the idea of being overwhelmed by irresistible urges is inaccurate in most cases. Instead, there are frequent but weak impulses. Many of these are resisted successfully, but some may eventually be enacted. Frequent or chronic resistance can deplete one’s willpower, so that the addict yields to a weak impulse that he or she would otherwise resist. In those cases, the lapse is caused not by an overwhelmingly powerful impulse but by a temporarily low level of willpower. The well documented patterns of increased relapse during stress or dysphoria could also reflect the fact that the person's resources have been depleted by coping with the stress or problem.

Abundant evidence contradicts the notion of being overwhelmed by irresistible impulses. The fact that usage and relapse are sensitive to price changes indicates that rational calculations influence behavior and that impulses can be resisted. Compliance with smoking restrictions is high, which it could not be if urges were truly irresistible. (Indeed, laws banning smoking in certain places are based on the assumption that addicted smokers are fully capable of resisting.) Meanwhile, incentives do improve success at quitting, such as if people receive money for remaining abstinent. Volpp et al. (2009) tripled the success rate of remaining abstinent. Volpp et al. (2009) tripled the success rate of smoking cessation by offering cash incentives. In their study, some participants quit smoking for 18 months (biochemically verified) to earn the maximum payoff and then resumed smoking, indicating that they were capable of abstinence but resumed smoking when there were no longer sufficient incentives to remain abstinent.

The idea that the compulsion to smoke becomes overwhelming, so that the ex-addict cannot resist relapsing, is popular among addicts but does not square well with available evidence. Sayette, Loewenstein, Kirchner, and Travis (2005) showed that smokers predict that their cravings will rise steadily over a period of abstinence but that those predictions are wrong. Cravings actually decrease in strength and frequency as soon as the person decides to quit (Carter & Tiffany, 2001; Shiffman et al., 1997; Wertz & Sayette, 2001). Still, these false expectations could influence decisions, such as by making the addict think that resistance is doomed to fail sooner or later.

Much evidence indicates that addictive relapse occurs during periods of stress and negative emotion (e.g., Fidler & West, 2009). The increases in substance abuse during premenstrual syndrome (PMS) appear to be linked to the reduced availability of glucose for self-regulation, caused by the female body's increased metabolic demands for glucose to be allocated to reproductive functions during the luteal phase of the menstrual cycle (Gailliot et al., 2010). Even ordinary demands on self-control increase the likelihood of lapse and relapse. Several studies have shown that dieters fared worse than non-dieters and weight gainers at quitting smoking (Patten & Martin, 1996). That is, allocating one's limited self-regulatory resources to resisting eating undermines one's ability to resist smoking.

As noted earlier, negative affect causes a shift in priorities for self-regulation (Tice et al., 2001), putting increased emphasis on feeling better in the short run, as opposed to restraining addiction. This can explain why lapse and relapse are especially likely when people are feeling bad: Even a rational self-regulator might calculate that alcohol or drugs hold more promise for quick affective boost than continued abstinence.

Self-regulation is not all on one side, however. The person still uses and may have to use self-control as before in order to facilitate use. The smoker who is trying to cut down still has to abide by smoking restrictions when having the few that are permitted.

8. Conclusion

Conscious, deliberate volition depends on a limited resource that is common to a wide variety of activities, including decision making and self-control. A simplistic view might hold that addictive substance use is essentially passive and helpless, and that active volition is used only to restrain desire and break free of addiction. Against that view, we have proposed that self-control and other forms of volition can be used to serve and promote addiction as well as to restrain and cure it. Initially, self-regulation must often be used to facilitate substance use. People may have to self-regulate to overcome initial distaste (beer tastes bad at first), uncool reactions (coughing from smoke), and personal fear (illicit drugs are considered dangerous). Maintaining addiction requires self-regulation to obtain substances and use them without creating problems, which means respecting rules as well as keeping one's addiction from spiraling out of control and interfering with normal life to the extent that the addiction becomes unsustainable. Quitting uses self-regulation to resist urges and temptations, though some addicts self-regulate to lapse in a planned, controlled manner, and others may lapse as a form of short-term affect regulation.

If addiction is understood as largely a matter of frequent albeit typically weak and resistible desires, then self-regulation is likely the pivotal factor determining whether the person yields or resists. Addiction presents multiple complications for self-regulation. Standards are not clear, because the person both wants to feel good and to avoid destructive effects from abuse. Monitoring, without which self-regulation is scarcely possible, can be impaired by emotional distress and even by substance use itself. Attempting to quit puts an ongoing drain on willpower, thus increasing the likelihood that some urge to use will coincide with a period of severely reduced self-regulatory capacity. Ego depletion, which may be caused by job or family stress or other factors seemingly irrelevant to addiction, intensifies subjective feelings and desires, thus presumably making the abstinent addict feel the urges to fall off the wagon especially strong (and perhaps intensifying the pleasure one gets by lapsing).

There is ample evidence that automatic processes are involved in addiction (e.g., Tiffany, 1990). Controlled processes including effortful self-regulation have been invoked mainly to account for efforts to resist and quit addiction. A full understanding of addiction may however benefit from understanding how self-regulation, volition, and controlled actions operate both for and against addictive substance use — and how these processes and contingencies change over the course of addiction.

Role of funding source

The John Templeton Foundation had no role in writing the manuscript or the decision to submit the paper for publication.

Contributors

Both authors contributed to conceptualization of the thesis and organization of the article. Both authors conducted literature searches and provided summaries of previous research studies. Roy Baumeister wrote the first draft of the manuscript and both authors contributed to and have approved the final manuscript.

Conflict of interest

Neither Dr. Baumeister nor Mr. Vonasch has any financial or nonfinancial relationships to disclose.

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