

Emotion and Self-Regulation Failure

Dylan D. Wagner

Todd F. Heatherton

As most people can attest, conquering vices and changing bad habits are difficult. Even when the motivation to change is strong, self-control failures are common. Subjectively, it often feels as though our capacity to self-regulate waxes and wanes in the face of new temptations, changing moods, and fatigue. Contemporary investigations into the causes of self-regulation failure have demonstrated that the ability to self-regulate can be undermined by a variety of threats that act by impairing awareness, exhausting limited resources, or increasing the salience of temptations. Perhaps the most potent of these threats is negative affect. When people experience emotional distress, be it in the form of a bad mood, disappointment, or social rejection, they often find it more difficult to resist temptations or to suppress unwanted impulses and may engage in various forms of self-defeating behaviors (for a review, see Baumeister, 1997). However, the relationship between emotions and self-control is by no means all one-way; too much self-regulation over a period of time can increase emotional reactivity, as well as impair an individual's ability to regulate his or her emotions.

Much like the experience of hunger or thirst, emotions serve to motivate behavior and predispose individuals toward certain actions (e.g., Keltner & Gross, 1999; Lev-

enson, 1994). It has been suggested that one function of emotion is to indicate whether individuals are succeeding or failing to meet their goals (Carver & Scheier, 1990). Therefore, just as it would be fatally maladaptive for an organism to have the ability to turn off thirst, it would be just as detrimental to be able to completely shut down emotions. However, there are times when our emotions interfere with our goals or may lead us to further distress, such as when our mood causes us to violate social norms (i.e., being tragically depressed on a first date or overjoyed at a funeral). Thus, it is often in our best interests to be able to regulate our affective states.

In this chapter, we take the view that regulating emotions relies on much of the same cognitive and neural machinery as regulating other responses (e.g., thoughts, behaviors, impulses) with the understanding that, all things being equal, emotions are more difficult to suppress or inhibit. Unlike behaviors, thoughts, or cravings, all of which tend to have a clear target of regulation (e.g., "I must not grab the cigarette and light it"), affect is typically more diffuse, with no clear action to regulate. Indeed, one of the central findings of research on emotion regulation is that direct, response-focused attempts to suppress the outward expression of emotion are more cognitively taxing and less success-

ful than antecedent-focused methods such as distraction and reappraisal (Richards & Gross, 2000). Although there may very well be advantages to considering emotion regulation as a separate domain (i.e., Gross, 2002), for the present discussion we consider it fruitful to think of emotion regulation as another type of self-regulation, thereby rendering it subject to the same vulnerabilities and threats as other forms of self-control (see Heatherton & Wagner, 2011).

In the following sections, we examine the relationship among emotions, emotion regulation, and self-regulation failure. We focus primarily on intrinsic forms of emotion regulation, in which individuals regulate their own internal affective states, rather than on extrinsic emotion regulation, in which individuals attempt to influence the emotions of others through affect displays or other means. Along with an overview of the mechanisms whereby emotions can derail self-regulation, we also consider the case of misregulation, for example, when individuals seek out temptations (e.g., food, drugs or alcohol) as a misguided strategy to repair their mood or escape from aversive self-awareness resulting from overindulgence of these same temptations. In addition, we review findings that regulation of emotions exerts a cost on self-regulatory capacity and, conversely, that engaging in effortful self-regulation can impair emotion regulation. Finally, we highlight recent research suggesting that emotional reactivity is increased when self-regulatory resources are depleted.

The Role of Negative Affect in Self-Regulation Failure

When dieters, substance abusers, or sexual offenders are asked to describe their reasons for engaging in harmful behaviors (e.g., binge eating, sexual aggression, smoking, and drug use) they overwhelmingly report that their actions were triggered by negative affect (Haedt-Matt & Keel, 2011; Kassel, Stroud, & Paronis, 2003; Pithers, Kashima, Cumming, Beal, & Buell, 1988; Sinha, 2007). Among the general population, negative affect is similarly associated with impulsive and self-defeating behaviors, such as alcohol consumption (Witkiewitz & Villarreal, 2009), gambling (Raviv, 1993), risky

sexual behavior (Bousman et al., 2009; Roberts et al., 2012), excessive Internet usage (LaRose, Lin, & Eastin, 2003), and aggression (Berkowitz, 1989). Although multiple emotions can be considered negative or positive in valence, the extant literature on the role of affect in self-regulation seldom dissociates them. Here, too, we employ the broad categories of negative and positive affect, noting that these necessarily subsume many different emotion categories.

The role of negative affect in initiating self-regulation failure has also been studied in experimental settings using a variety of affect induction procedures. Generally, these procedures involve exposure to sad or aversive stimuli in the form of images, music, or movie clips. Other commonly used techniques include writing about negative life events (i.e., a funeral) or reading a series of increasingly negative self-referential statements, such as in the Velten (1968) mood induction procedure. Much of this work has been conducted within the realm of drug and alcohol addiction, where negative affect has long been known to be the most potent cause of relapse (e.g., Marlatt & J. Gordon, 1985). In smokers and other substance abusers, inducing negative affect in the laboratory has been shown to increase substance cravings (Childress et al., 1994; Fox, Bergquist, Hong, & Sinha, 2007; Tiffany & Drobes, 1990; Willner & Jones, 1996) and the intensity of substance use (McKee et al., 2011) when compared to neutral or positive mood inductions.

Chronic dieters are another population that has received considerable attention with regards to the relationship between negative affect and self-regulation failure (i.e., disinhibited eating). Inducing negative emotional states in dieters increases eating both in comparison to non-dieters, but also to dieters in a neutral mood (e.g., Baucom & Aiken, 1981; Heatherton, Strieppe, & Wittenberg, 1998; Herman & Polivy, 1975). For instance, Heatherton, Herman, and Polivy (1991) induced negative affect either by giving participants negative performance feedback during a cognitive task or by instructing them that they would have to prepare a speech that would be given in the presence of their peers. In order to measure overeating, participants were asked to participate in an unrelated taste-test of various flavors

of ice cream, which, unbeknownst to them, had been weighed prior to the task so that the amount of ice cream consumed could be calculated afterwards. In both cases, dieters ate significantly more ice cream than non-dysphoric subjects. Moreover, this occurred even when negative affect was induced by having participants anticipate a future task (i.e., public speaking). Similar findings have been found for social drinkers, in whom fear of future social evaluations increases alcohol consumption relative to participants who were not going to be evaluated (Higgins & Marlatt, 1975).

Social rejection is another method of inducing negative affect that has a rich history of being associated with behavioral disinhibition, aggression, and violent crimes (e.g., high school shootings; Leary, Kowalski, Smith, & Phillips, 2003). Laboratory studies in which subjects are induced to feel socially excluded have found that being rejected increases aggression (DeWall, Twenge, Bushman, Im, & Williams, 2010; Twenge, Baumeister, Tice, & Stucke, 2001; Warburton, Williams, & Cairns, 2006) and reduces the willingness to help others (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). For example, when given the opportunity to decide how much hot sauce to administer to a group of people who had previously been identified as disliking spicy foods, rejected individuals assigned four times more hot sauce than nonrejected peers (Warburton et al., 2006). With respect to self-regulation failures, social exclusion has been shown to have the same effects as other negative affect inductions, leading to overeating (Baumeister, DeWall, Ciarocco, & Twenge, 2005; Oaten, Williams, Jones, & Zadro, 2008) and reduced persistence on difficult tasks (Baumeister et al., 2005). Thus it seems that, as with negative affect, social rejection can lead to self-regulation failure, although with an added dose of aggression.

Why Does Negative Affect Impair Self-Control?

So far we have reviewed various lines of evidence demonstrating that negative affect can precipitate a variety of maladaptive behaviors, most of which are indicative of poor self-control. In the following sections

we consider a number of mechanisms that have been proposed to explain the disinhibiting effects of negative affect. Many of these mechanisms target specific aspects of self-regulation, so it is important at this stage to briefly review some of the core components involved in theories of self-regulation.

Although the details vary, most models of self-regulation can be said to deal with three basic components. The first involves a target state that is to be attained. This can be a goal, such as the goal to quit smoking or to avoid contaminating the palate with cheap wines, but this may also be a set of standards, such as rules of conduct (i.e., whenever possible, avoid drinking and teaching). The second component involves an awareness of one's actions, often referred to as *monitoring*. In cybernetic models of self-regulation (e.g., Carver & Scheier, 1981), monitoring involves comparing current behavior with the desired goal state and signaling any discrepancy. Monitoring is a particularly vulnerable component of self-regulation, as a failure to monitor ongoing behavior necessarily entails an inability to catch (and therefore control) unwanted actions. The final component is regulation itself. Upon identifying a thought or an emotion that conflicts with his or her goals, that person must be capable of implementing a strategy to inhibit or otherwise disarm the unwanted impulse. Limited capacity models of self-regulation (Baumeister & Heatherton, 1996) emphasize the ways in which this component operates like a muscle and is therefore subject to improvement through training and also to breakdowns through fatigue. Figure 36.1A depicts a model of self-regulation wherein monitoring, limited capacity resources, and goals interact with the strength of impulses and temptations, ultimately determining self-regulatory success or failure.

In the following sections we turn to some of the proposed mechanisms for how negative affect may impair self-control. As we shall see, negative affect appears to have the pernicious ability to operate on each of the aforementioned components of self-regulation. Acting like poison tendrils, it reaches into all aspects of self-control (Figure 36.1B), interfering with monitoring, exhausting the capacity to regulate behavior, and increasing the strength of desires and temptations.

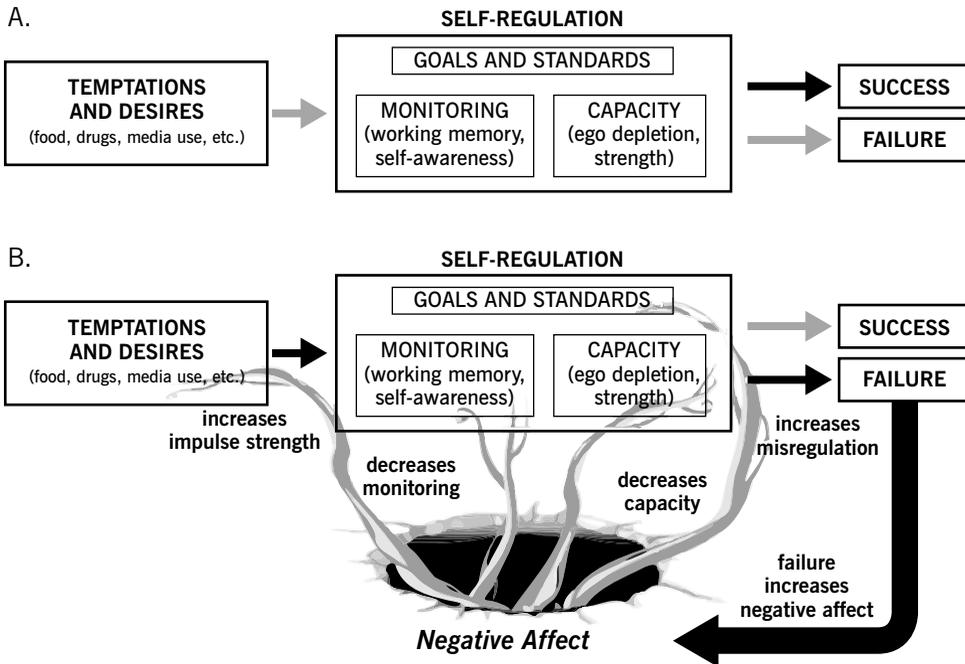


FIGURE 36.1. (A) Under normal circumstances, when a person is faced with temptations, successful self-regulation involves a balance between the strength of impulses and the capacity to monitor and regulate behavior in the service of goals and standards. (B) Negative affect spreads poison tendrils into every aspect of self-regulation, amplifying desires, decreasing monitoring, depleting limited capacity, and encouraging misregulation strategies (e.g., mood repair and escape from aversive self-awareness), which can relieve negative affect in the short term but often lead to further negative affect upon failure to meet one's goals.

How Might Negative Affect Impair Self-Control?

Negative Affect Increases the Strength of Temptations

In their dual-system model of self-control, Metcalfe and Mischel (1999) theorize that negative affect may impair the cool system involved in executing control, while simultaneously increasing the hot system that responds to temptations and rewards. In support of this, studies of delay of gratification have shown that negative affect increases the frequency with which people accept immediate gratification instead of waiting for larger, delayed rewards (Mischel, Ebbsen, & Zeiss, 1973; Seeman & Schwarz, 1974; Tice, Bratslavsky, & Baumeister, 2001).

Interestingly, studies of nonhuman animals have revealed similar patterns in the form of increased reward sensitivity in dis-

tressed animals. For example, the induction of emotional distress via social isolation increases food and drug consumption (Campbell Teskey, Kavaliers, & Hirst, 1984; Ramsey & Van Ree, 1993). This heightened reward sensitivity is thought to be due to the release of glucocorticoids during distressing situations that serve to sensitize the brain's reward circuitry to appetitive stimuli (Deroche et al., 1995; Piazza & Le Moal, 1996). Although difficult to directly measure in humans, research has demonstrated that when people receive an artificial administration of glucocorticoids, they subsequently eat more relative to a placebo group (Tataranni et al., 1996).

In humans, negative affect has been shown to increase the intensity of smoking in smokers (McKee et al., 2011), as well as how much pleasure people report experiencing when smoking (Zinser, Baker, Sherman,

& Cannon, 1992). Results from a recent functional neuroimaging study of chronic dieters offer further evidence that negative affect may serve to increase the rewarding properties of appetitive stimuli—in this case of appetizing foods. Following a negative or neutral mood induction, chronic dieters were exposed to appetizing food cues during functional neuroimaging (Wagner, Boswell, Kelley, & Heatherton, 2012). Relative to nondieters, dysphoric dieters showed increased brain activity in the orbitofrontal cortex, a brain area implicated in representing the rewarding value of appetizing foods. Moreover, activity in the orbitofrontal cortex and ventral striatum was correlated with a measure of how distressing subjects found the negative mood induction, suggesting that increases in reward-related brain activity to food cues were dependent on the strength of the negative emotional state (Wagner et al., 2012). Taken together, these findings from both human and animal studies suggest that negative affect may sensitize people to rewards, thereby rendering temptations more difficult to regulate.

Negative Affect Reduces Monitoring through Cognitive Load

Another mechanism whereby negative affect may reduce self-control is by impairing the monitoring component of self-regulation. Specifically, research demonstrates that when dieters overeat following a negative mood induction, they are less aware than nondieters of the precise amount of food they have consumed (Heatherton, Polivy, Herman, & Baumeister, 1993). Reasons for this reduced awareness vary from a motivated desire to escape from negative affect (see the next section) to an increase in cognitive load as a result of ruminating over one's mood. In this section we focus on the possibility that experiencing negative affect can lead to increased working memory load as people ruminate over their negative mood and neglect to monitor their behavior (Figure 36.1B).

As monitoring entails the ability to maintain goals and standards in working memory (Hofmann, Schmeichel, & Baddeley, 2012), it follows that a concurrent working memory load (e.g., attempting to regulate mood or ruminating over one's performance anx-

eties) will impair task-relevant monitoring. Perhaps nowhere has this mechanism been better studied than in research on the phenomenon of stereotype threat. This work has shown that reminding women of negative stereotypes about their gender, or reminding African Americans of negative stereotypes about their race, can lead them to underperform on math or intelligence tests (Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995). Studies demonstrate that this decrement in performance is at least in part due to a reduction in working memory capacity, which is thought to result from concurrent attempts to regulate affect (Johns, Inzlicht, & Schmader, 2008). This phenomenon has been shown to “spill over” into nonstereotyped domains, as shown in work by Inzlicht and Kang (2010), who demonstrate that inducing stereotype threat in women results in disinhibited eating of unhealthy foods. Further evidence that working memory is impacted by negative affect comes from studies in which inducing emotional distress through the anticipation of an upcoming evaluation (e.g., public speaking) leads to poorer performance on working memory tests (Schoofs, Preuss, & Wolf, 2008). Indeed, one imaging study found that stereotype threat leads to increased activity in brain regions associated with affect (i.e., ventral anterior cingulate cortex) but not in areas that support working memory (Krendl, Richeson, Kelley, & Heatherton, 2008). In this case, the authors argued that it is likely that emotional distress resulting from stereotype threat has downstream effects on working memory.

Outside of the realm of negative affect, research on the effects of cognitive load on self-regulation have shown that cognitive loads impairs a variety of controlled behaviors, from suppressing thoughts (Wegner & Erber, 1992) to inhibiting food consumption in dieters (Ward & Mann, 2000). Mann and Ward (2007) proposed an attentional myopia theory of cognitive load, which posits that cognitive load restricts the range of attention to targets in the immediate environment, thereby rendering individuals vulnerable to a variety of external cues. To the extent that negative affect increases cognitive load through rumination or attempts to regulate affect (Johns et al., 2008), a similar attentional myopia may

occur when people are experiencing a negative emotional state.

Another means by which cognitive load can bring about self-regulation failure comes from research on ironic process theory (Wegner, 1994) demonstrating that when mental capacity is taxed by a concurrent cognitive load, the likelihood of counterintentional behavior increases. Within the realm of emotion regulation, it has been shown that attempting to change one's mood (either from happy to sad or vice versa) while under a concurrent cognitive load leads to an ironic increase in the opposite mood state. Specifically, participants who were instructed to make themselves feel sad, felt happier if they regulated their mood while under cognitive load (Wegner, Erber, & Zanakos, 1993). With respect to the role of affect in bringing about self-regulation failure, what this suggests is that to the degree that negative affect exerts a cognitive load, attempts to regulate behavior simultaneously, such as stopping oneself from smoking, may bring about the exact behavior one is trying to avoid.

Directing people's attention toward the self has a long history of being used as a means to increase monitoring, and thereby self-regulation. With regard to negative affect inductions, exposure to mirrors or to video clips of oneself has been shown to eliminate the effects of negative mood on disinhibited behavior. For example, having dieters watch a video of themselves after a mood induction eliminated the effects of negative affect on overeating as compared to dieters who watched a neutral video (Heatherton et al., 1993). Similarly, being forced to sit in front of a mirror has been shown to eliminate the detrimental effects of social rejection on a self-regulation task (Baumeister et al., 2005). It appears then, that increasing self-awareness tempers the impact of negative affect on self-regulation failures by restoring monitoring and increasing the accessibility of behavioral standards (e.g., Scheier & Carver 1983). However, the timing of increased self-attention may be important; for instance, increasing self-attention during the experience of emotion has been shown to heighten the intensity of emotions (Scheier & Carver, 1983; Fenigstein, 1979) which in turn may exacerbate the effects of negative affect on subsequent self-regulation.

Managing Negative Affect Depletes Self-Regulatory Strength

Over the last decade, considerable evidence has been gathered in favor of a strength model of self-regulation (for a recent meta-analysis, see Hagger, Wood, Stiff, & Chatzisarantis, 2010). This model posits that self-regulation relies on a common resource that can become temporarily exhausted by effortful self-regulation, and that when this resource is exhausted, further attempts at self-regulation are likely to fail (Baumeister & Heatherton, 1996). This phenomenon is typically studied using a sequential task paradigm in which an initial self-regulatory task is used to deplete resources, thereby rendering subsequent self-regulation attempts (even those in different domains) less likely to succeed. Studies have shown that tasks as varied as suppressing thoughts and stereotypes (Gordijn, Hindriks, Koomen, Dijksterhuis, & Van Knippenberg, 2004; Muraven, Collins, & Nienhaus, 2002), making decisions (Vohs et al., 2008), and managing impressions (Richeson & Shelton, 2003) all can lead to self-regulation failure on subsequent tasks. In terms of relevance to this chapter, it is interesting to note that one of the methods most often used for depleting self-regulatory resources is to have participants engage in an emotion regulation task (typically inhibiting emotional responses). For example, regulating emotional responses to an emotionally provocative film reduces persistence on difficult tasks (Baumeister, Bratslavsky, Muraven, & Tice, 1998), impairs performance on executive tasks (Schmeichel, Vohs, & Baumeister, 2003) and leads dieters to break their diets and overeat (Vohs & Heatherton, 2000). These findings strongly suggest that emotion regulation exhausts a common domain-general resource leading to impairments on subsequent self-control tasks.

As we have seen in the previous section, negative affect is often accompanied by concurrent attempts to regulate that affect. To the degree that this emotion regulation strategy is effortful, the strength mode of self-regulation suggests that, above and beyond the cost incurred to monitoring (see previous section), regulating negative affect would also deplete self-regulatory strength, increasing the likelihood of self-regulation failure. Indeed, in the previously mentioned

study by Vohs and Heatherton (2000) this is precisely what was found when dieters who were asked to inhibit their expression of sadness while watching an emotionally evocative video subsequently overindulged themselves in appetizing ice cream.

Although the bulk of the research on self-regulatory depletion and emotion examines how emotion regulation can produce subsequent self-regulation failure on nonemotional tasks, studies shows that this effect goes both ways, such that engaging in effortful self-regulation also impairs subsequent attempts at emotion regulation. The first researchers who looked at this question had participants engage in a thought suppression task, followed by an emotion regulation task that required participants to inhibit expressing emotions evoked by an emotional video (Muraven, Tice, & Baumeister, 1998). They found that participants whose resources had been depleted by the thought suppression task were subsequently less successful at inhibiting their emotions. In another study, Schmeichel (2007) extended these findings to more traditional tasks of executive function. In this experiment, participants completed a complex working memory task, followed by an emotion inhibition task. As in the Muraven et al. (1998) study, participants whose self-regulatory resources were depleted by the complex working memory task were impaired at suppressing their emotions relative to a nondepleted control group (Schmeichel, 2007).

More recently, the interplay between self-regulatory strength and emotional regulation was investigated using functional neuroimaging (Wagner & Heatherton, 2013). In this study, participants were assigned to either a depletion condition, in which they completed a difficult attention control task, or a control condition. Next, all participants viewed a series of emotional scenes differing in valence. Compared to control participants, those who were depleted exhibited greater neural activity in the amygdala, a region involved in the perception and detection of emotion, when viewing negative emotional scenes. Moreover, depleted participants exhibited reduced connectivity between the amygdala and prefrontal regions implicated in top-down control, suggesting a failure to engage in emotion regulation (Wagner & Heatherton, 2013).

Taken together, the results of the studies reviewed in this section offer both behavioral and neural evidence that engaging in self-regulation, be it in the emotional or the cognitive domain, leads to transient impairments in subsequent self-regulation attempts. Thus, with respect to our poison tendrils model of negative affect, ongoing attempts to regulate negative affect serve to reduce self-regulatory capacity, thereby increasing the likelihood of self-regulation failure (Figure 36.1B). Moreover, these findings suggest that it is important to consider the individual's prior self-regulatory context, as having to engage in other forms of self-regulation can lead to transient impairments of emotion regulation, which may exacerbate the effects of negative affect on self-regulation.

Depleting Self-Regulatory Strength Intensifies Emotions and Impulses

Although early models of self-regulation tacitly assumed that the strength of impulses and emotions remain essentially unchanged during self-regulation failure, recent theories suggest that impulses and emotions may increase in strength when self-control is depleted (e.g., Heatherton & Wagner, 2011; Schmeichel, Harmon-Jones, & Harmon-Jones, 2010; Vohs et al., submitted). For instance, the recent study by Vohs and colleagues demonstrated that when participants are in a depleted state, they experience stronger cravings for appetizing food, as well as rate emotions and pain as being felt more acutely than do nondepleted participants). The results of the brain imaging study by Wagner and Heatherton (2013) bear some similarities to these findings. Although the results of this study were interpreted in terms of emotion dysregulation following depletion, it is equally plausible that self-regulatory depletion served to amplify people's experience of affect, resulting in greater amygdala activity in response to negative scenes, thus making emotion regulation more difficult.

This relatively new line of research suggests that self-regulatory depletion not only harms subsequent attempts at self-control but also increases the strength of emotions and desires. For the current discussion this suggests that managing ongoing negative

affect may not only reduce self-regulatory capacity but also lead to a concurrent increase in the intensity of currently experienced affect, thereby amplifying its deleterious effects on all aspects of self-regulation, as indicated by the path between depletion and negative affect in Figure 36.1B.

Mood Repair and Escaping Negative Affect Take Precedence over Long-Term Goals

One likely explanation for why people turn to eating, smoking, and drinking in times of emotional distress is that they believe such activities can restore their mood (Sayette, 1993). Indeed, even in nonhuman animals, consuming pleasurable foods has been shown to reduce neuroendocrine markers of distress (Foster et al., 2009). In humans, research has shown that merely being exposed to appetizing stimuli (e.g., food, drugs, alcohol) can activate positive hedonic thoughts (Hofmann, van Koningsbruggen, Stroebe, Ramanathan, & Aarts, 2010; Sayette & Hufford, 1997). For instance, in dieters, exposure to descriptions of appetizing foods has been shown to spontaneously activate more hedonic thoughts about the pleasurable aspects of eating than descriptions of neutral foods (Papies, Stroebe, & Aarts, 2007). This attention to the pleasurable aspects of temptations can have serious consequences, especially in cases of alcohol and substance use in which withdrawal from the substance elicits negative affect that is relieved only by further substance use. It has been suggested that this need to cope with—and escape from—negative affect produced by withdrawal is one of the central motivations underlying addiction (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Moreover, through prolonged conditioning of substance use and improved mood, any experience of negative affect—whether due to specific triggers or merely the vicissitudes of daily life—can trigger the desire for drugs or alcohol (Baker et al., 2004; Childress et al., 1994).

Given people's belief that consuming food and alcohol or engaging in pleasurable activities will improve their mood, is there any empirical evidence that people employ this strategy when experiencing negative affect? Studies examining a wide range of behaviors show that, upon experiencing negative

affect, people report consuming their favorite substance (e.g., food, alcohol, or drugs) or engaging in their favorite activity (e.g., shopping, television, gambling) precisely because they believe it will make them feel better (e.g., Faber & Christenson, 1996; Rook, 1987; Sayette, 1993). Thus, when stuck in a negative emotional state, people will shirk their long-term goals in order to address the more immediate need to feel better. One particularly disconcerting example of mood repair following negative affect comes from a study in which participants were asked to rate the personalities of ethnic ingroup and outgroup members. Participants who were induced to experience negative affect—as a result of negative performance feedback on an ostensibly unrelated test—subsequently rated the ethnic outgroup members more negatively than did control subjects (Fein & Spencer, 1997). Moreover, it was found that this tendency to denigrate outgroup members led to increased self-esteem in the negative affect group, suggesting that participants denigrated outgroup members in order to make themselves feel better. Likewise, when people experience social rejection, they become more willing to take illicit drugs or waste money on goods that are liked by their peers, but not necessarily by themselves, if doing so increases their chances at fitting in (Mead, Baumeister, Stillman, Rawn, & Vohs, 2011). Other examples involve the effect of negative affect on spending. In these studies, negative affect has been shown to increase participant's willingness to pay more for goods, as well as sell things they already own for less money (Lerner, Small, & Loewenstein, 2004). These findings were taken to indicate that people see buying new things or selling old things as a way of changing their current state and thereby escape negative affect.

Although attempting to repair one's mood through engaging in pleasurable activities such as eating may seem like a good temporary strategy to alleviate negative affect, studies show that this form of mood repair is often a case of *misregulation*. Unlike other forms of self-regulation failure, misregulation is not so much a lack of self-control as the use of self-control in a misguided—and often futile—attempt to improve one's state (Baumeister & Heatherton, 1996). For instance, studies show that although dieters may binge-eat in an attempt to improve their mood, they often end up feeling worse

after eating than they did before (for a meta-analysis, see Haedt-Matt & Keel, 2011).

Finally, a study by Tice and colleagues (2001) elegantly demonstrated that certain cases of disinhibited behavior are due entirely to a motivated attempt to improve affective states. In this study, participants were induced to experience negative affect, but in one group they were given a pill and told that it would freeze their mood. Whereas participants who did not receive the mood-freezing pill exhibited typical signs of self-regulation failure, such as eating unhealthy foods or procrastinating with pleasurable activity before a task, those who took the mood-freezing pill showed no signs of disinhibition (Tice et al., 2001). Thus, when participants believed engaging in pleasurable activities could not improve their negative emotional state, they ceased trying to change their mood by indulging in these activities.

The case of misregulation is particularly interesting, because it suggests that self-regulation failure following negative affect is not always due to a failure in the machinery of self-regulation; rather it reflects a conscious shift in priorities as people focus on improving their immediate affective state at the expense of their long-term regulatory goals. Indeed, it has been suggested that sometimes people actually use self-control to bring about personal harm, such as when they smoke or use drugs to fit in and make friends (Rawn & Vohs, 2011). However, these short-term strategies often lead to more negative affect as people move further and further away from their goals, such as when dieters overeat to improve their mood but then find themselves further from their goal of weight loss (Heatherton & Polivy, 1992).

Intimately related to the notion of misregulation is research on escape from self-awareness (Baumeister, 1991; Heatherton & Baumeister, 1991). In contrast to the mood repair hypothesis outlined earlier, escape theory posits that self-awareness is aversive for people who possess negative self-views (see Higgins, 1987). Unfortunately, for those with negative self-views, increasing self-awareness does not help them regulate, because self-awareness itself can lead to negative affect as people's attention becomes focused on their perceived shortcomings (Mor & Winquist, 2002). For these people,

escaping self-awareness becomes an effective strategy for reducing negative affect. However, attempts to reduce self-awareness come at the expense of the ability to focus on long-term goals and an increased vulnerability to temptations in the immediate environment. For example, dieters who experience a self-esteem threat are more likely than nondieters to overeat (Heatherton et al., 1993). Likewise, following self-esteem threats, people drink more alcohol (Hull & Young, 1983), watch more television (Moskalenko & Heine, 2003) and avoid sitting in front of mirrors (Twenge, Catanese, & Baumeister, 2003).

With respect to our model, this suggests that, in some instances, negative affect interferes with the machinery of self-regulation (e.g., monitoring or capacity), but in other circumstances, people chose to indulge in temptations as a means of repairing their mood. This form of misregulation may temporarily relieve negative affect, but once the awareness sets in that people have failed at their regulatory goals, further negative affect ensues, thus jeopardizing future attempts at self-regulation (see also Heatherton and Polivy's [1992] spiral model describing the relationship between negative affect and chronic dieting).

Are All Negative Emotions Equally Likely to Cause Self-Regulation Failure?

In many of the studies we have reviewed, *negative affect* refers primarily to any unpleasurable or aversive emotional state, thus subsuming a variety of emotional categories—from frustration to shame to social rejection. In some cases, negative affect is assessed through self-reports, whereas in others the emotional state is experimentally induced, affording more control over the specific emotions produced. That being said, differences between negative emotion types are seldom reported, with two exceptions. The first involves research in chronic dieters demonstrating that negative affect inductions that specifically target an individual's self-esteem (e.g., negative performance feedback, social rejection) are more effective at producing disinhibited eating (Heatherton et al., 1991, 1993, 1998; Lattimore & Maxwell, 2004) than induc-

tions targeting physical distress (e.g., fear of electric shock; Heatherton et al., 1991; Herman & Polivy, 1975).

The second exception involves research on the consequences of being socially excluded. As described earlier, social rejection can lead to poorer task performance, selfishness, aggression, and increased eating in dieters. Paradoxically, however, other studies indicate that inducing feelings of social rejection can increase affiliative behaviors (Maner, DeWall, Baumeister, & Schaller, 2007; Williams & Sommer, 1997), as well as improve memory for social information (Gardner, Pickett, & Brewer, 2000). One explanation for this discrepancy is that socially rejected people are adaptively deploying both protective and affiliative strategies, such that when the opportunity for forging new social bonds appears low (as in some experiments) they react with selfish and occasionally hostile behaviors, whereas when there is an opportunity for meaningful social contact, they instead switch to an affiliative strategy in an attempt to repair their self-esteem (e.g., Baumeister, Brewer, Tice, & Twenge, 2007; Maner et al., 2007; Smart Richman & Leary, 2009). Indeed, a recent imaging study found that interpersonal distress led to increased mental engagement for positive social stimuli (as indexed by activity in medial prefrontal cortical regions associated with mentalizing) and decreased engagement for negative social stimuli (Powers, Wagner, Norris, & Heatherton, 2013). Although these reactions to social rejection have only tangential bearing on self-regulation failure, they do highlight the complexity of the relationship between negative affect and self-regulation, demonstrating that reactions to negative affect can strategically vary according to the individual's goals. As described in the previous sections, what can appear to be a failure to maintain self-control may instead be a strategy to repair mood through consuming foods or alcohol, or engaging in pleasurable activities at the expense of other regulatory goals.

Can Negative Affect Ever Increase Self-Regulation Success?

Much of the work discussed here has examined the influence of affect on self-regulation in “hot” contexts, such as when faced with

the opportunity to indulge in temptations or pleasurable activities. Emotion can, however, color behavior in other ways. For instance, in Schwarz's (1990) feelings as information model, an individual's current emotional state can be used as information in making evaluative judgments or resolving ambiguities. For example, following a negative mood induction, people tend to judge their current happiness and life satisfaction less positively than when in a positive mood (Schwarz & Clore, 1983). Other research shows that people in a negative mood tend to elaborate on information, demonstrating more accurate performance on tasks requiring attention to details (reviewed in Schwarz, 1990). Other theorists have suggested that emotions signal the need for self-regulation. For instance, Carver and Scheier (1990) argued that positive emotions signal that a person is achieving his or her goal (e.g., successfully dieting), whereas negative emotions arise when a person is moving away from his or her goal (e.g., gaining weight during a diet). From this perspective, then, negative affect should serve to increase rather than thwart efforts at self-regulation. The discrepancy between the preceding theories and the evidence reviewed in this chapter can be resolved if we consider when in time these effects are likely to take place. In this chapter we have primarily focused on the role of negative affect in eliciting self-regulation failure “in the moment,” when people are confronted with the immediate need to regulate themselves, such as when faced with temptations. Over longer time frames, outside of these “hot” moments, negative affect may very well serve to motivate individuals to change their current state for the better (Heatherton & Polivy, 1992).

The Role of Positive Affect in Self-Regulation Success and Failure

In the preceding sections we have focused solely on the role of negative affect in self-regulation failure, with scant mention of its opposite, positive affect. This is largely for two reasons: First, researchers have often neglected positive affect in favor of negative affect (see Ashby, Isen, & Turken, 1999); second, of the research that does consider positive affect, there is less evidence that it

plays a strong part in self-regulation failures or successes, at least in the types of contexts discussed in this chapter. For example, compared to positive moods, negative moods and events are typically found to be more memorable and are experienced more intensely (see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). Moreover, in the mood induction studies reviewed earlier, of those that have directly compared negative and positive affect, negative always trump positive (Willner & Jones, 1996; Tiffany & Drobes, 1990). Thus, it appears that negative affect is generally a much more potent force than positive affect in self-regulation failure.

Does positive affect promote self-regulation success? There is some research suggesting that positive affect can serve to momentarily increase self-regulation strength. For instance, when people hold the goal of self-improvement in mind, positive affect inductions lead to increased use of self-control (Fishbach & Labroo, 2007). Based on these results, Fishbach and Labroo suggest that positive affect pushes people to strive toward a currently activated goal. If that goal happens to be about self-improvement, then self-regulation may follow; however, if the goal is mood regulation, then self-regulation may suffer to the degree that it is opposed to maintaining a positive mood. Another study showing beneficial effect of positive affect on self-regulation found that inducing positive affect restored self-regulation capacity following self-regulatory depletion (Tice, Baumeister, Shmueli, & Muraven, 2007). This finding suggests that the capacity to engage in self-control is at least partially moderated by affect. In fact, to the degree that participants in the Tice et al. study hold the goal to succeed at the tasks laid out by the experimenters, then the results of Fishbach and Labroo (2007) would suggest that the positive affect induction reversed the effects of self-regulatory depletion by pushing subjects to expend whatever resources they had left in the service of the goal of succeeding at the task. It is worth pointing out that although these studies suggest that positive affect can increase self-control under certain circumstances, it is likely that under a different set of circumstances (e.g., at a bar), with a different goal in mind (e.g., celebrating with friends), positive affect may lead to greater celebratory excess.

Conclusion

Negative affect may very well be the most potent disinhibitor of restrained behavior. When people feel worthless, depressed, or rejected, they are more likely to engage in a variety of self-defeating behaviors. Following negative affect, dieters overeat, former smokers smoke, and alcoholics fall into relapse. More generally, people become more likely to procrastinate, to be selfish or hostile, and even go so far as to denigrate out-group members. Negative affect appears to accomplish this pernicious feat by poisoning all facets of self-regulation (see Figure 36.1): sensitizing people to rewards and temptations, decreasing monitoring of behavior, reducing self-regulatory capacity, and causing people to focus on repairing their mood at the expense of abandoning their goals and giving in to their impulses and desires.

Although it often appears that our self-control is entirely at the mercy of our emotions, it is also the case that emotion regulation can be derailed by prior attempts at self-regulation in the cognitive domain. For instance, engaging in effortful self-regulation tasks can exhaust self-regulatory resources, thereby jeopardizing subsequent emotion regulation attempts. Moreover, recent research has shown that when people are cognitively depleted by prior attempts at self-regulation, emotions and impulses appear to increase in potency, rendering them a more forceful adversary to self-control.

The interplay among emotions, emotion regulation, and self-regulation has been discussed as though each of the myriad ways that emotions can hijack self-control work independently of the others. However, it is far more likely that the multiple routes to self-regulation failure are themselves interactive. For instance, negative affect can lead to a desire to escape negative states by reducing self-awareness and also to engage in pleasurable activities, even if these activities conflict with long-term goals. Together, these may serve to increase the pull of immediately available rewards, because the ability to monitor behavior is lessened as the focus shifts to pleasure. Negative affect may also place a load on working memory independent of the desire to escape self-awareness, thus further reducing the ability to monitor behavior. Throw in the fact that prior self-regulatory effort may leave the individual

in a depleted state in which both resources for further self-control are lacking and the strength of impulses and temptations is increased, and it is a small miracle that people are not constantly acting out their fantasies, drinking, smoking, or indulging every gastronomic desire. If the studies reviewed in this chapter paint a dire picture, it is important to note that emotion is not all bad: For instance, it has been demonstrated that experiencing positive emotions can improve self-regulation by helping to buffer against the depleting effects of prior tasks (Tice et al., 2007).

In this chapter we reviewed evidence suggesting that negative emotions are a potent cause of self-regulation failure and we have proposed a simple poison tendrils model in which negative affect invades and disrupts nearly every aspect of self-regulatory function. Moreover, results from a variety of behavioral and neural studies suggest that the relationship between emotions and self-regulation is dynamic and interactive, such that emotion-induced self-regulation failure serves not only to intensify currently experienced emotions and desires but also to increase negative affect as the individual moves further and further away from his or her goals. Negative affect is thus a particularly potent threat to self-regulation, because it not only reduces the capacity for control (increased working memory load, reduced self-awareness and monitoring) but it may also lead to increases in the strength of experienced desires and emotions, rendering them all the more difficult to resist.

References

- Ashby, F. G., Isen, A. M., & Turken, A. U. (1999). A neuropsychological theory of positive affect and its influence on cognition. *Psychological Review*, *106*(3), 529–550.
- Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: An affective processing model of negative reinforcement. *Psychological Review*, *111*(1), 33–51.
- Baucom, D. H., & Aiken, P. A. (1981). Effect of depressed mood in eating among obese and nonobese dieting and nondieting persons. *Journal of Personality and Social Psychology*, *41*(3), 577–585.
- Baumeister, R. F. (1991). *Escaping the self: Alcoholism, spirituality, masochism, and other flights from the burden of selfhood*. New York: Basic Books.
- Baumeister, R. F. (1997). Esteem threat, self-regulatory breakdown, and emotional distress as factors in self-defeating behavior. *Review of General Psychology*, *1*(2), 145–174.
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, *5*(4), 323–370.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*(5), 1252–1265.
- Baumeister, R. F., Brewer, L. E., Tice, D. M., & Twenge, J. M. (2007). Thwarting the need to belong: Understanding the interpersonal and inner effects of social exclusion. *Social and Personality Psychology Compass*, *1*(1), 506–520.
- Baumeister, R. F., DeWall, C. N., Ciarocco, N. J., & Twenge, J. M. (2005). Social exclusion impairs self-regulation. *Journal of Personality and Social Psychology*, *88*(4), 589–604.
- Baumeister, R. F., & Heatherton, T. (1996). Self-regulation failure: An overview. *Psychological Inquiry*, *7*(1), 1–15.
- Berkowitz, L. (1989). Frustration–aggression hypothesis: Examination and reformulation. *Psychological Bulletin*, *106*(1), 59–73.
- Bousman, C. A., Cherner, M., Ake, C., Letendre, S., Atkinson, J. H., Patterson, T. L., et al. (2009). Negative mood and sexual behavior among non-monogamous men who have sex with men in the context of methamphetamine and HIV. *Journal of Affective Disorders*, *119*(1–3), 84–91.
- Campbell Teskey, G., Kavaliers, M., & Hirst, M. (1984). Social conflict activates opioid analgesic and ingestive behaviors in male mice. *Life Sciences*, *35*(3), 303–315.
- Carver, C. S., & Scheier, M. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. New York: Springer-Verlag.
- Carver, C. S., & Scheier, M. F. (1990). Origins and functions of positive and negative affect: A control-process view. *Psychological Review*, *97*(1), 19–35.
- Childress, A. R., Ehrman, R., McLellan, A. T., MacRae, J., Natale, M., & O'Brien, C. P. (1994). Can induced moods trigger drug-related responses in opiate abuse patients?

- Journal of Substance Abuse Treatment*, 11(1), 17–23.
- Deroche, V., Marinelli, M., Maccari, S., Le Moal, M., Simon, H., & Piazza, P. V. (1995). Stress-induced sensitization and glucocorticoids: I. Sensitization of dopamine-dependent locomotor effects of amphetamine and morphine depends on stress-induced corticosterone secretion. *Journal of Neuroscience*, 15(11), 7181–7188.
- DeWall, C. N., Twenge, J. M., Bushman, B., Im, C., & Williams, K. (2010). A little acceptance goes a long way applying social impact theory to the rejection–aggression link. *Social Psychological and Personality Science*, 1(2), 168–174.
- Faber, R. J., & Christenson, G. A. (1996). In the mood to buy: Differences in the mood states experienced by compulsive buyers and other consumers. *Psychology and Marketing*, 13(8), 803–819.
- Fein, S., & Spencer, S. J. (1997). Prejudice as self-image maintenance: Affirming the self through derogating others. *Journal of Personality and Social Psychology*, 73(1), 31–44.
- Fenigstein, A. (1979). Self-consciousness, self-attention, and social interaction. *Journal of Personality and Social Psychology*, 37(1), 75–86.
- Fishbach, A., & Labroo, A. A. (2007). Be better or be merry: How mood affects self-control. *Journal of Personality and Social Psychology*, 93(2), 158–173.
- Foster, M. T., Warne, J. P., Ginsberg, A. B., Horneman, H. F., Pecoraro, N. C., Akana, S. F., et al. (2009). Palatable foods, stress, and energy stores sculpt corticotropin-releasing factor, adrenocorticotropic, and corticosterone concentrations after restraint. *Endocrinology*, 150(5), 2325–2333.
- Fox, H. C., Bergquist, K. L., Hong, K., & Sinha, R. (2007). Stress-induced and alcohol cue-induced craving in recently abstinent alcohol-dependent individuals. *Alcoholism: Clinical and Experimental Research*, 31(3), 395–403.
- Gardner, W. L., Pickett, C. L., & Brewer, M. B. (2000). Social exclusion and selective memory: How the need to belong influences memory for social events. *Personality and Social Psychology Bulletin*, 26(4), 486–496.
- Gordijn, E. H., Hindriks, I., Koomen, W., Dijksterhuis, A., & Van Knippenberg, A. (2004). Consequences of stereotype suppression and internal suppression motivation: A self-regulation approach. *Personality and Social Psychology Bulletin*, 30(2), 212–224.
- Gross, J. J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology*, 39(3), 281–291.
- Haedt-Matt, A. A., & Keel, P. K. (2011). Revisiting the affect regulation model of binge eating: A meta-analysis of studies using ecological momentary assessment. *Psychological Bulletin*, 137(4), 660–681.
- Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin*, 136(4), 495–525.
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin*, 110(1), 86–108.
- Heatherton, T. F., Herman, C. P., & Polivy, J. (1991). Effects of physical threat and ego threat on eating behavior. *Journal of Personality and Social Psychology*, 60(1), 138–143.
- Heatherton, T. F., & Polivy, J. (1992). Chronic dieting and eating disorders: A spiral model. In J. H. Crowther, D. L. Tennenbaum, S. E. Hobfoll, & M. A. P. Stephens (Eds.), *The etiology of bulimia nervosa: The individual and familial context* (pp. 133–155). Washington, DC: Hemisphere.
- Heatherton, T. F., Polivy, J., Herman, C. P., & Baumeister, R. F. (1993). Self-awareness, task failure, and disinhibition: How attentional focus affects eating. *Journal of Personality*, 61(1), 49–61.
- Heatherton, T. F., Striepe, M., & Wittenberg, L. (1998). Emotional distress and disinhibited eating: The role of self. *Personality and Social Psychology Bulletin*, 24(3), 301–313.
- Heatherton, T. F., & Wagner, D. D. (2011). Cognitive neuroscience of self-regulation failure. *Trends in Cognitive Sciences*, 15(3), 132–139.
- Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of Abnormal Psychology*, 84(6), 666–672.
- Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94(3), 319–340.
- Higgins, R. L., & Marlatt, G. A. (1975). Fear of interpersonal evaluation as a determinant of alcohol consumption in male social drinkers. *Journal of Abnormal Psychology*, 84(6), 644–651.
- Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences*, 16(3), 174–180.
- Hofmann, W., van Koningsbruggen, G. M.,

- Stroebe, W., Ramanathan, S., & Aarts, H. (2010). As pleasure unfolds: Hedonic responses to tempting food. *Psychological Science*, 21(12), 1863–1870.
- Hull, J. G., & Young, R. D. (1983). Self-consciousness, self-esteem, and success-failure as determinants of alcohol consumption in male social drinkers. *Journal of Personality and Social Psychology*, 44(6), 1097–1109.
- Inzlicht, M., & Kang, S. K. (2010). Stereotype threat spillover: How coping with threats to social identity affects aggression, eating, decision making, and attention. *Journal of Personality and Social Psychology*, 99(3), 467–481.
- Johns, M., Inzlicht, M., & Schmader, T. (2008). Stereotype threat and executive resource depletion: Examining the influence of emotion regulation. *Journal of Experimental Psychology: General*, 137(4), 691–705.
- Kassel, J. D., Stroud, L. R., & Paronis, C. A. (2003). Smoking, stress, and negative affect: Correlation, causation, and context across stages of smoking. *Psychological Bulletin*, 129(2), 270–304.
- Keltner, D., & Gross, J. J. (1999). Functional accounts of emotions. *Cognition and Emotion*, 13(5), 467–480.
- Krendl, A. C., Richeson, J. A., Kelley, W. M., & Heatherton, T. F. (2008). The negative consequences of threat: A functional magnetic resonance imaging investigation of the neural mechanisms underlying women's underperformance in math. *Psychological Science*, 19(2), 168–175.
- LaRose, R., Lin, C., & Eastin, M. (2003). Unregulated Internet usage: Addiction, habit, or deficient self-regulation? *Media Psychology*, 5(3), 225–253.
- Lattimore, P., & Maxwell, L. (2004). Cognitive load, stress, and disinhibited eating. *Eating Behaviors*, 5(4), 315–324.
- Leary, M. R., Kowalski, R. M., Smith, L., & Phillips, S. (2003). Teasing, rejection, and violence: Case studies of the school shootings. *Aggressive Behavior*, 29(3), 202–214.
- Lerner, J. S., Small, D. A., & Loewenstein, G. (2004). Heart strings and purse strings: Carryover effects of emotions on economic decisions. *Psychological Science*, 15(5), 337–341.
- Levenson, R. W. (1994). Human emotion: A functional view. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 123–126). New York: Oxford University Press.
- Maner, J. K., DeWall, C. N., Baumeister, R. F., & Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection?: Resolving the “porcupine problem.” *Journal of Personality and Social Psychology*, 92(1), 42–55.
- Mann, T., & Ward, A. (2007). Attention, self-control, and health behaviors. *Current Directions in Psychological Science*, 16(5), 280–283.
- Marlatt, G. A., & Gordon, J. (1985). *Relapse prevention: Maintenance strategies in the treatment of addictive behaviors*. New York: Guilford Press.
- McKee, S. A., Sinha, R., Weinberger, A. H., Sofuoglu, M., Harrison, E. L., Lavery, M., et al. (2011). Stress decreases the ability to resist smoking and potentiates smoking intensity and reward. *Journal of Psychopharmacology*, 25(4), 490–502.
- Mead, N. L., Baumeister, R. F., Stillman, T. F., Rawn, C. D., & Vohs, K. D. (2011). Social exclusion causes people to spend and consume strategically in the service of affiliation. *Journal of Consumer Research*, 37(5), 902–919.
- Metcalfe, J., & Mischel, W. (1999). A hot/cold-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, 106(1), 3–19.
- Mischel, W., Ebbesen, E. B., & Zeiss, A. R. (1973). Selective attention to the self: Situational and dispositional determinants. *Journal of Personality and Social Psychology*, 27(1), 129–142.
- Mor, N., & Winquist, J. (2002). Self-focused attention and negative affect: A meta-analysis. *Psychological Bulletin*, 128(4), 638–662.
- Moskalenko, S., & Heine, S. J. (2003). Watching your troubles away: Television viewing as a stimulus for subjective self-awareness. *Personality and Social Psychology Bulletin*, 29(1), 76–85.
- Muraven, M., Collins, R. L., & Nienhaus, K. (2002). Self-control and alcohol restraint: An initial application of the self-control strength model. *Psychology of Addictive Behaviors*, 16(2), 113–120.
- Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology*, 74(3), 774–789.
- Oaten, M., Williams, K. D., Jones, A., & Zadro, L. (2008). The effects of ostracism on self-regulation in the socially anxious. *Journal of Social and Clinical Psychology*, 27(5), 471–504.
- Papies, E., Stroebe, W., & Aarts, H. (2007). Pleasure in the mind: Restrained eating and spon-

- taneous hedonic thoughts about food. *Journal of Experimental Social Psychology*, 43(5), 810–817.
- Piazza, P. V., & Le Moal, M. L. (1996). Pathophysiological basis of vulnerability to drug abuse: Role of an interaction between stress, glucocorticoids, and dopaminergic neurons. *Annual Review of Pharmacology and Toxicology*, 36, 359–378.
- Pithers, W. D., Kashima, K. M., Cumming, G. F., Beal, L. S., & Buell, M. M. (1988). Relapse prevention of sexual aggression. *Annals of the New York Academy of Sciences*, 528(1), 244–260.
- Powers, K. E., Wagner, D. D., Norris, C. J., & Heatherton, T. F. (2013). Socially excluded individuals fail to recruit medial prefrontal cortex for negative social scenes. *Social Cognitive and Affective Neuroscience*, 8(2), 151–157.
- Ramsey, N. F., & Van Ree, J. M. (1993). Emotional but not physical stress enhances intravenous cocaine self-administration in drug-naive rats. *Brain Research*, 608(2), 216–222.
- Raviv, M. (1993). Personality characteristics of sexual addicts and pathological gamblers. *Journal of Gambling Studies*, 9(1), 17–30.
- Rawn, C. D., & Vohs, K. D. (2011). People use self-control to risk personal harm: An intra-interpersonal dilemma. *Personality and Social Psychology Review*, 15(3), 267–289.
- Richards, J. M., & Gross, J. J. (2000). Emotion regulation and memory: The cognitive costs of keeping one's cool. *Journal of Personality and Social Psychology*, 79(3), 410–424.
- Richeson, J. A., & Shelton, J. N. (2003). When prejudice does not pay: Effects of interracial contact on executive function. *Psychological Science*, 14(3), 287–290.
- Roberts, M. E., Gibbons, F. X., Gerrard, M., Weng, C.-Y., Murry, V. M., Simons, L. G., et al. (2012). From racial discrimination to risky sex: Prospective relations involving peers and parents. *Developmental Psychology*, 48(1), 89–102.
- Rook, D. W. (1987). The buying impulse. *Journal of Consumer Research*, 14(2), 189–199.
- Sayette, M. A. (1993). An appraisal-disruption model of alcohol's effects on stress responses in social drinkers. *Psychological Bulletin*, 114(3), 459–476.
- Sayette, M. A., & Hufford, M. R. (1997). Effects of smoking urge on generation of smoking-related information. *Journal of Applied Social Psychology*, 27(16), 1395–1405.
- Scheier, M. F., & Carver, C. S. (1983). Self-directed attention and the comparison of self with standards. *Journal of Experimental Social Psychology*, 19(3), 205–222.
- Schmeichel, B. J. (2007). Attention control, memory updating, and emotion regulation temporarily reduce the capacity for executive control. *Journal of Experimental Psychology: General*, 136(2), 241–255.
- Schmeichel, B. J., Harmon-Jones, C., & Harmon-Jones, E. (2010). Exercising self-control increases approach motivation. *Journal of Personality and Social Psychology*, 99(1), 162–173.
- Schmeichel, B. J., Vohs, K. D., & Baumeister, R. F. (2003). Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. *Journal of Personality and Social Psychology*, 85(1), 33–46.
- Schoofs, D., Preuss, D., & Wolf, O. T. (2008). Psychosocial stress induces working memory impairments in an *n*-back paradigm. *Psychoneuroendocrinology*, 33(5), 643–653.
- Schwarz, N. (1990). Feelings as information: Informational and motivational functions of affective states. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior* (Vol. 2, pp. 527–561). New York: Guilford Press.
- Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology*, 45(3), 513–523.
- Seeman, G., & Schwarz, J. C. (1974). Affective state and preference for immediate versus delayed reward. *Journal of Research in Personality*, 7(4), 384–394.
- Sinha, R. (2007). The role of stress in addiction relapse. *Current Psychiatry Reports*, 9(5), 388–395.
- Smart Richman, L., & Leary, M. R. (2009). Reactions to discrimination, stigmatization, ostracism, and other forms of interpersonal rejection: A multimotive model. *Psychological Review*, 116(2), 365–383.
- Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype Threat and Women's Math Performance. *Journal of Experimental Social Psychology*, 35(1), 4–28.
- Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69(5), 797–811.

- Tataranni, P. A., Larson, D. E., Snitker, S., Young, J. B., Flatt, J. P., & Ravussin, E. (1996). Effects of glucocorticoids on energy metabolism and food intake in humans. *American Journal of Physiology: Endocrinology and Metabolism*, 271(2), E317–E325.
- Tice, D. M., Baumeister, R. F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology*, 43(3), 379–384.
- Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology*, 80(1), 53–67.
- Tiffany, S. T., & Drobes, D. J. (1990). Imagery and smoking urges: The manipulation of affective content. *Addictive Behaviors*, 15(6), 531–539.
- Twenge, J. M., Baumeister, R. F., DeWall, C. N., Ciarocco, N. J., & Bartels, J. M. (2007). Social exclusion decreases prosocial behavior. *Journal of Personality and Social Psychology*, 92(1), 56–66.
- Twenge, J. M., Baumeister, R. F., Tice, D. M., & Stucke, T. S. (2001). If you can't join them, beat them: Effects of social exclusion on aggressive behavior. *Journal of Personality and Social Psychology*, 81(6), 1058–1069.
- Twenge, J. M., Catanese, K. R., & Baumeister, R. F. (2003). Social exclusion and the deconstructed state: Time perception, meaninglessness, lethargy, lack of emotion, and self-awareness. *Journal of Personality and Social Psychology*, 85(3), 409–423.
- Velten, E. (1968). A laboratory task for induction of mood states. *Behaviour Research and Therapy*, 6(4), 473–482.
- Vohs, K. D., Baumeister, R. F., Mead, N. L., Hofmann, W. J., Ramanathan, S., & Schmeichel, B. J. (submitted). *Engaging in self-control heightens urges and feelings*.
- Vohs, K. D., Baumeister, R. F., Schmeichel, B. J., Twenge, J. M., Nelson, N. M., & Tice, D. M. (2008). Making choices impairs subsequent self-control: A limited-resource account of decision making, self-regulation, and active initiative. *Journal of Personality and Social Psychology*, 94(5), 883–898.
- Vohs, K. D., & Heatherton, T. F. (2000). Self-regulatory failure: A resource-depletion approach. *Psychological Science*, 11(3), 249–254.
- Wagner, D. D., Boswell, R. G., Kelley, W. M., & Heatherton, T. F. (2012). Inducing negative affect increases the reward value of appetizing foods in dieters. *Journal of Cognitive Neuroscience*, 24(7), 1625–1633.
- Wagner, D. D., & Heatherton, T. F. (2013). Self-regulatory depletion increases emotional reactivity in the amygdala. *Social Cognitive and Affective Neuroscience*, 8(4), 410–417.
- Warburton, W. A., Williams, K. D., & Cairns, D. R. (2006). When ostracism leads to aggression: The moderating effects of control deprivation. *Journal of Experimental Social Psychology*, 42(2), 213–220.
- Ward, A., & Mann, T. (2000). Don't mind if I do: Disinhibited eating under cognitive load. *Journal of Personality and Social Psychology*, 78(4), 753–763.
- Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review*, 101(1), 34–52.
- Wegner, D. M., & Erber, R. (1992). The hyperaccessibility of suppressed thoughts. *Journal of Personality and Social Psychology*, 63(6), 903–912.
- Wegner, D. M., Erber, R., & Zanakos, S. (1993). Ironic processes in the mental control of mood and mood-related thought. *Journal of Personality and Social Psychology*, 65(6), 1093–1104.
- Williams, K. D., & Sommer, K. L. (1997). Social ostracism by coworkers: Does rejection lead to loafing or compensation? *Personality and Social Psychology Bulletin*, 23(7), 693–706.
- Willner, P., & Jones, C. (1996). Effects of mood manipulation on subjective and behavioural measures of cigarette craving. *Behavioural Pharmacology*, 7(4), 355–363.
- Witkiewitz, K., & Villarroya, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of Consulting and Clinical Psychology*, 77(4), 633–644.
- Zinser, M. C., Baker, T. B., Sherman, J. E., & Cannon, D. S. (1992). Relation between self-reported affect and drug urges and cravings in continuing and withdrawing smokers. *Journal of Abnormal Psychology*, 101(4), 617–629.