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Self-regulation (also referred to as self-control) has become a popular research topic in psychology over the past few decades. During this recent time period, researchers and thinkers have recognized the significance of self-regulation and its importance for understanding human well-being and human nature. Self-regulation is a pervasive feature of everyday life (Hofmann, Baumeister, Förster, & Vohs, 2012). A range of activities such as deciding what to wear, suppressing unwanted thoughts, inhibiting a rude (or honest) remark, and feigning laughter all involve self-regulation and self-control. This ability is one of humans' defining characteristics. Other animals may have some ability for self-control; however, self-control in non-human animals pales in comparison to humans. As will be discussed in greater detail later, effective self-regulation is an important part of living a successful life. Conversely, failure at self-regulation is a central factor involved in many problems for both the individual and society at large. Self-regulation is an impressive evolutionary achievement and very likely an essential step for development of civilization and culture. Being able to restrain one's desires and override initial responses allows a

great degree of flexibility, far surpassing that of any other species. Among other benefits, self-regulation enables people to pursue and achieve long-term benefits when these require short-term sacrifices and costs. According to some views (e.g., Baumeister, 2005) the central thrust of human evolution was the emergence of the capacity to create and sustain culture, and self-regulation is intimately connected with this evolutionary advancement and the development of culture and civilization.

In this chapter we provide a general background on self-regulation, followed by a more detailed explanation of the strength model of self-regulation, and then we discuss its relation to mindfulness. First, the chapter will define self-regulation (and self-control). Following this, the operation of self-regulation and its basic elements are discussed, and a strength model of self-regulation is explicated. Some research highlighting the benefits of successful self-regulation is outlined. Last, some aspects of mindfulness are looked at from the strength model perspective of self-regulation and relations between the two are addressed.

Definition of Self-Regulation

To regulate something means to change or adjust it. More specifically, to regulate means to change in a particular sort of way: a way that is in

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accordance with some rule, ideal, goal or some other kind of standard. In brief, self-regulation is regulation of the self by the self (Baumeister, Heatherton, & Tice, 1994; Carver & Scheier, 1981). To self-regulate, then, means to change some thought, feeling, or behavior in such a way that it conforms to some standard.

The term self-control can be used interchangeably with self-regulation. However, some authors maintain an important distinction between the two. Self-control refers to the active, conscious, effortful capacity of self-regulation. Self-regulation can also occur at the unconscious level (see Bargh, 1990; Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001; Chartrand & Bargh, 1996; Fitzsimons & Bargh, 2003). In other words, there may be unconscious self-regulation but no unconscious self-control. This chapter, however, will focus on conscious self-regulation, and so self-regulation and self-control can be used interchangeably for present purposes.

Self-control is the ability to override reactions to impulses, urges, and habitual responses in such a way that the following thoughts, feelings, or behaviors will fall in line with personal or cultural standards. Self-control has sometimes been equated with impulse control, but impulse control is in a sense a misnomer. The impulse itself is not being controlled. What is being controlled is how one deals with the given impulse. Thus, self-control enables people to adjust their own behaviors and inner states, thereby enabling a high degree of adaptability and flexibility.

Elements of Self-Regulation

Self-regulation can be broken down into three main components. The first is establishing a goal or desired state. This is also generally referred to as having a standard. The second is monitoring progress toward the standard. The third is the capacity to make the desired changes. This refers to the strength or ability one has to make changes. A deficit in any one of these components can lead to self-regulation failure. We shall now explain each of these.

Standards

Self-regulation is about changing the self, but without standards any change would be random and without aim or purpose. Standards provide guidance for how one should change. A standard can be a rule, law, or social norm which one is motivated to follow. A standard could also be a personal goal, value, or ideal. The reasons behind selecting or creating a particular standard can be a complex, dynamical cognitive process influenced by a variety of interpersonal, intrapersonal, and situational variables (Higgins, 1987). Despite this complexity, humans do not often lack standards. In fact, rather than a lack of standards, the more common problem is an overabundance of standards. This can lead to self-regulatory breakdown, especially if standards conflict (Baumeister et al., 1994). Moral dilemmas typically involve two conflicting standards, so that adhering to one standard entails violating another. Standards that are vague, ambiguous, or unclear can make self-regulation difficult and prone to failure. Another common clash between standards involves the desire to feel better in the short-term versus the desire to achieve some long-term goal. Imagine a person on a diet who is feeling upset and is contemplating eating some junk food. To alleviate his or her negative feelings, a person will prefer a short-term solution over a long-term solution; therefore, eating some unhealthy food can offer an immediate although temporary wave of pleasure. But this short-term goal conflicts with the long-term goal of losing weight. Thus, being upset or in a negative emotional state can compromise other standards involving self-control. This regulation of immediate emotional distress has been shown to override other patterns of self-control related to distal goals (Tice, Bratslavsky, & Baumeister, 2001).

Some work on standards comes from Higgins and his colleagues (e.g., Higgins, 1987; Higgins, Roney, Crowe, & Hymes, 1994; Shah, Higgins, & Friedman, 1998). This research makes a distinction between *ideal* standards and *ought* standards. Ideal standards represent positive strivings toward the way one would like to be. Ought standards are also based on how one would like to be,

but they involve following particular duties, obligations, or laws. Higgins and colleagues suggest that violations of these types of standards are accompanied by different emotions. The type of negative emotion is what differs. Failure to self-regulate toward ideals produces low arousal emotions, such as disappointment and sadness. On the other hand, failure to self-regulate toward ought standards produces high arousal emotions such as stress and worry. Simply having standards is not enough to ensure that they will be followed. One must be motivated to adhere to a standard. Higgins and colleagues (e.g., Higgins & Spiegel, 2004) suggest that there are also different motivational patterns used to engage in self-regulation. Such patterns are commonly referred to as regulatory focus. Some individuals are promotion-focused: they are primarily motivated to reach desirable outcomes by pursuing ideal standards using eager, approach-oriented strategies. Other individuals are prevention focused: they are primarily motivated to reach desirable outcomes by pursuing ought standards using vigilant, avoidance-oriented strategies. When the regulatory standard type (ideal or ought) matches regulatory focus style (promotion or prevention), it is referred to as regulatory fit. Research suggests that when people experience regulatory fit, self-regulatory outcomes are improved (Higgins, 2000). For example, research by Keller and Bless (2006) found that individuals performed better on a cognitive task when their chronic regulatory focus style matched the situationally induced self-regulatory mechanisms of the task. When the task was described in a self-regulatory prevention way (as the potential for loss), those with a chronic prevention focus performed better compared to when the same task was described in a self-regulatory promotion way (as the potential for gain). However, some ideas by Higgins and colleagues have received criticism. Tangney, Niedenthal, Covert, and Barlow (1998) tested some of Higgins' hypotheses. A major finding was that violating certain types of standards was not significantly related to a distinct emotional experience (i.e., low arousal vs. high arousal). Thus, the core point of the theory, linking different standards to different emotional

patterns, is under question. At present it seems reasonable to conclude that violating standards often brings some emotional distress, but there appears to be very little recently published work that pursues the notion of specific, differentiated standards linked to specific emotions.

In sum, standards are a necessary but not sufficient ingredient for successful self-regulation. Without standards, self-regulation would be without purpose and offer no conceivable benefits. Sometimes, one can hold standards that conflict with each other, which can cause certain self-regulatory patterns to be compromised. But having standards alone is not enough to successfully achieve them. One must have a desire and motivation to reach a standard. A standard that exhorts one to eat healthy food or quit smoking will have little effect if the person lacks motivation to try to live up to it.

Monitoring

Monitoring refers to keeping track of activities that are relevant to achieving a goal or standard and noting the extent to which progress is being made. A prominent book by Carver and Scheier (1981) argued that one of the main functions of self-awareness is to facilitate self-regulation. Indeed, it would be quite difficult to change a behavior if one were not aware of it. Self-awareness involves more than just being aware that one exists, or that one has brown hair. It involves a comparison of aspects of the self to standards. For example, one can be aware that one is overweight only by comparison to some social or medical standard. Borrowing from cybernetic theory, Carver and Scheier suggested that self-regulation is similar to a feedback loop. The feedback loop involves four steps called test, operate, (re)test, and exit (TOTE; Miller, Galanter, & Pribram, 1960). The first test phase consists of comparing one's current status on a particular thing to the relevant standard. If the standard is met, there is no need to move on to the next phase. However, if the standard has not been reached, then the operate phase will begin.

The operate phase involves making changes and attempting to make the current status fall into line with the relevant standard. At some point during or after the operate phase, another test will occur. If this test determines the standard has been met, then the feedback loop will be exited, otherwise it will resume or continue the operate phase. A good example of the ill effects of reduced self-awareness (and therefore monitoring) on self-regulation is alcohol use. Alcohol intoxication reduces self-awareness (Hull, 1981) and is associated with an array of self-regulatory impairments (Baumeister et al., 1994). A major reason appears to be that alcohol intoxication stops people from keeping track of relevant behaviors, so they succumb to excess. Monitoring, then, is an important tool for successful self-regulation.

The Strength Model

The third element of self-regulation is the capacity to make changes. For successful self-regulation, it is not enough for one to have standards and monitor progress toward those standards. One must also exert effort toward achieving those standards. This aspect of self-regulation can be thought of as the operate phase of the TOTE model.

Recent evidence suggests that successful self-control depends on a limited resource (see Baumeister & Tierney, 2011; Gailliot et al., 2007; Gailliot & Baumeister, 2007). Folk wisdom has recognized that “willpower” is an important part of self-control. Scientific investigation has found that such a notion of willpower is not far off the mark. The terms *limited resource model*, *energy model*, and *strength model* will be used interchangeably.

Baumeister et al. (1994) suggested that an individual’s capacity for self-control was limited. They contended that self-control can be viewed as an energy model, where initial acts involving self-control would lead to less effective self-control in subsequent tasks because of the depletion of an energy resource. Subsequent research had participants perform two self-control tasks in

a row as a way to test the energy model (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice, & Baumeister, 1998). This two-task paradigm allowed researchers to test three competing models of self-regulation. First, if self-regulation primarily involved information processing and operated as a cognitive construct, the recent use of self-control on the first task should make schemas of self-control more accessible and therefore the participant should perform better on the second task. Second, if self-control operated as a skill, participants would display a similar performance on both tasks, but would gradually get better over time. Third, if self-control operated as the limited resource model predicts, participants should perform worse on the second task of self-control than on the first, because the available energy resource would be temporarily reduced.

Many subsequent empirical findings have supported the limited resource model of self-control. When participants performed acts controlling thoughts, behaviors, or feelings, the ability to perform on subsequent self-control tasks was impaired. Muraven et al. (1998) had participants watch an emotionally distressing movie clip with a specific set of instructions. Some were instructed to suppress their emotional reactions, others were instructed to exaggerate their reactions, and others were instructed to not alter their emotions. After this task, participants did a test of physical stamina using a handgrip exerciser. It was found that those who had had to alter their emotional reactions in some way (either suppressing or exaggerating) performed worse on the handgrip task, compared to those who did not alter emotional reactions. It seems, then, that those who had to regulate their emotions consumed some of the resource, which left less available to use in the handgrip task.

In another study, participants began the experiment on an empty stomach and were seated at a table with a freshly baked pile of chocolate chip cookies on one side, and a bowl of radishes on the other. Some participants were told that their task was to only eat the radishes; they were then left alone on the room with the cookies and radishes in front of them. Participants in the control

condition were told they could eat the cookies. The second self-control task was a series of difficult (unsolvable) puzzles. The results supported the limited resource model. Those who were told to only eat the radishes gave up on the puzzles significantly faster than those who ate the cookies. The results suggest that resisting the temptation to eat the cookies drained some self-control resource. Participants in this depleted state had less self-regulatory strength to persevere on the next, unrelated self-regulatory task (Baumeister et al., 1998).

Another study found that participants who completed a thought suppression exercise were more likely to drink free beer than those who had solved math problems (Muraven, Collins, & Nienhaus, 2002). Math problems may be unpleasant but they do not require self-control and therefore do not deplete the self, whereas suppressing thoughts is an important form of self-regulation.

Furthermore, a recent meta-analysis by Hagger, Wood, Stiff, and Chatzisarantis (2010) combined results from 83 similar self-control depletion studies and found a significant effect of depletion on self-control task performance. Participants who had been depleted from using self-control on an initial task exerted less self-control and therefore performed worse on a second task, compared to those who were not depleted. It was also found that the effect size of depletion on self-control task performance was influenced by the duration of time between self-control tasks. When there was less rest time between tasks, depletion from the first task had a stronger effect on performance of the second task. Hagger et al. (2010) also reported that when participants have put in some training on a self-control task, they perform better on that task when in a depleted state compared to those who have not previously trained on the task. This pattern of depleted self-control ability is commonly referred to as “ego depleted.” The term was selected to pay homage to Sigmund Freud, one of the most prominent thinkers to use an energy model of the self (ego).

All of these studies show that the first and second act of self-control do not have to be related in order for depletion effects to occur. Suppressing

emotions impairs perseverance on a subsequent hand exercise, and resisting chocolate chip cookies hampers persistence on difficult puzzles. This implies that a common resource is being drawn upon for a range of self-regulation tasks. These studies offer support for a vital component of the strength model: they show that self-regulation depends on a limited resource that becomes depleted when one exerts self-regulatory efforts.

Increasing Self-Control Strength

Another prediction of the strength model is that self-control should gradually improve over time with regular exercise. Thus, self-control may resemble a muscle: after immediate usage it gets tired and less effective, but with continual exercise it should get stronger (Baumeister, Vohs, & Tice, 2007; Muraven & Baumeister, 2000). Some research supports this prediction. Muraven, Baumeister, and Tice (1999) had some participants practice particular self-regulatory tasks (e.g., maintaining good posture) for 2 weeks. Other participants did not practice anything over the same 2-week period. Following this, participants returned to the laboratory and completed two consecutive self-regulatory tasks (a thought suppression task followed by a persistence task). It was found that those who practiced self-regulation for 2 weeks lasted longer (compared to their previously measured baseline score) on the persistence task than those who did not practice. The 2-week exercise period apparently improved self-regulatory stamina. The self-control muscle, so to speak, did not tire out as easily in the group who had exercised it for 2 weeks. Another study by Oaten and Cheng (2006) found similar self-regulatory improvements after a period of regular exercise. They found that those who were assigned to a 2-month long physical exercise program, compared to those not in the program, displayed reduced impairments on a second self-control task and also reported an increase in self-control behavior such as reduced cigarette smoking and eating healthier. A series of studies by Gailliot, Plant, Butz, and Baumeister (2007) found that participants who completed 2 weeks

of self-regulation exercises (e.g., changing speaking patterns, using their nondominant hand for common tasks) performed better on a second self-regulatory task than those who did not do the self-regulation exercises.

After recent use of self-control it becomes fatigued, tired, and less effective. The ability for one to use self-control more effectively and for longer periods of time can be enhanced if one regularly exercises self-control. Thus, recent evidence seems to support the idea that self-control resembles a muscle that becomes fatigued after use and increases in strength with regular practice.

Conservation and Motivation

If self-regulation relies on limited resource, then people would be expected to allocate self-regulation resources in an efficient and judicious manner, which would entail not expending them on superfluous or frivolous tasks. Thus, ego depletion effects indicate conservation rather than complete expenditure of the resources. Indeed, Muraven, Shmueli, and Burkley (2006) demonstrated that people conserve their self-regulatory resources as needed. This research found that performance on self-control tasks was more likely to be impaired when participants knew they had to do another self-control task later, as compared to when no further task was anticipated. Apparently, those who were anticipating doing another self-control task had the wherewithal to conserve some of their resources.

Motivation is another factor involved in self-control. Muraven and Slessareva (2003) found that participants who were depleted (from completing a previous self-control task) and offered an incentive (e.g., getting paid for better performance) to complete a subsequent self-control task performed significantly better than those who were also depleted but not offered any incentive. An incentive did not influence task performance for those who were not depleted. Findings from this study show that when people have been depleted by an initial self-control task, an increase in motivation can override

depletion effects and thus enhance performance on subsequent self-control tasks.

Some research has found that personal beliefs and self-affirmation can influence typical depletion effects. Schmeichel and Vohs (2009) found that thinking about important personal values counteracted the ill effects of depletion. This study had participants rank order a list of personal values (e.g., friends, family, aesthetics). Those in the self-affirmation condition then thought about and wrote about their top ranked value. It was found that engaging in this self-affirmation activity between self-control tasks significantly facilitated performance on the second self-control task. This effect was only found for depleted participants. For participants who did not engage in an initial depleting self-control task, self-affirmation had no effect on performance of the second task. Another study by Job, Dweck, and Walton (2010) found that participants who believed willpower was unlimited were less impaired by ego depletion than participants who did not believe willpower was unlimited.

A recent study by Vohs, Baumeister, and Schmeichel (2012) examined the extent to which beliefs and motivations influence self-control. They found that when depletion was mild (completing one self-control task), particular beliefs and motivations eliminated the typical depletion effects. Specifically, those who were manipulated to believe that willpower was unlimited (Experiment 1) or motivated by task importance (Experiment 2) did not display self-regulation impairment on a following self-control task. However, when participants had completed multiple self-control tasks, belief and motivation did not improve self-control performance. When ego depletion was more extensive, motivation and belief did not countervail the typical depletion effects.

The contrary effects of beliefs about unlimited willpower with mild versus severe depletion help explain a seeming paradox. If Job et al. (2010) were correct that believing in unlimited willpower could actually make willpower unlimited, then it would be surprising if any society in the world had failed to adopt such a highly adaptive

belief. Yet belief in unlimited willpower is very far from the norm. The reason, presumably, is that such a belief is counterproductive just when willpower is most needed (i.e., when demands for self-control are high).

Summary of the Strength Model

Performance on a second self-control task is impaired as a result of having used some of the limited resources on an initial self-control task. The strength model suggests that an act of self-control consumes a limited resource. After engaging in self-control, availability of the resource is temporarily reduced, and one will be less effective at self-control while in this depleted state. The same resource is used for a variety of self-regulatory tasks such as resisting temptations, suppressing thoughts, and persisting on difficult tasks. If one uses self-regulatory resources within a certain domain, all other domains are vulnerable to impairment. According to the strength model, self-control resembles a muscle. Like a muscle, self-control capacity can be improved with regular practice and exercise.

Evidence has strongly supported the strength model of self-control, and some recent research has augmented certain aspects of it. Particularly, some research (e.g., Job et al., 2010; Muraven & Slessareva, 2003) suggests that personal beliefs (e.g., believing willpower is unlimited), and motivation (such as monetary incentives) can counteract typical depletion impairments. Other research shows that personal beliefs and motivation can offset typical self-control impairments associated with depletion, but only in cases of mild depletion (Vohs et al., 2012). As depletion becomes more severe, the influence of belief and motivation diminishes. Hence, it appears that there are variables involved with self-control ability that are not directly related to strength or a limited resource. But it seems that these other variables are only relevant at mild levels of depletion. It is likely that self-regulation ability is an interaction between biologically based energy levels and subjective psychology factors.

Benefits of High Self-Control

Self-control is an important feature of success and well-being. Successful self-control is crucial for the optimal function of humans on the individual and collective level. Inadequate self-control, on the other hand, is a core feature of many societal and individual ills. This section will outline some domains in life where successful self-regulation is an important factor.

The importance of dispositional self-control was highlighted by Walter Mischel and his colleagues (e.g., Mischel, Ebbsen, & Zeiss, 1972; Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990) on the delay of gratification. Delay of gratification is an important form of self-control because it requires one to override impulsive reactions in order to obtain a more desirable outcome at a later time. The research by Mischel and colleagues investigated differences in trait levels of self-regulation. In these delay of gratification studies children were presented with a choice to have an immediate treat or a more desirable treat at a later time. Some children were unable to resist and nibbled away at the treat right away, while other children were able to wait and ultimately received the more desirable treat. Follow-up studies found that the ability to delay gratification as a child predicts personal well-being as a young adult. Those who had been able to resist the immediate temptation as a child were more likely to do well in school, to be popular, to have higher SAT scores, and to exhibit better mental health than those who had had poor self-control and had been unable to resist the immediate temptation (Mischel et al., 1988; Shoda et al., 1990).

Poor self-control has also been recognized as one of the most important aspects for understanding crime (Gottfredson & Hirschi, 1990; Pratt & Cullen, 2000). People usually engage in criminal behavior because they have poor self-control and have a hard time controlling responses to antisocial impulses. Hollywood likes to portray criminals as well thought out, calculated, criminal masterminds (e.g., the “criminal genius”). However these are not the characteristics of the everyday person who engages in crime. Criminals

tend to be impulsive and often fail to consider long-term goals or consequences. Another way, then, that effective self-control is beneficial for both society and the individual is that it reduces one's tendency for acting on antisocial impulses or urges.

Tangney, Baumeister, and Boone (2004) measured trait levels of self-control and then examined several areas of self-regulatory functioning. Those who had higher self-control scores were better off than those with low self-control scores on almost all of the outcomes. Individuals with higher self-control scores performed better in school, had higher empathy, maintained healthier relationships with friends and family, and their relationships involved less conflict. Further, those with high self-control had higher self-esteem, better psychological adjustment, better emotion regulation abilities, and fewer impulse control problems. High self-control, then, is a valuable trait that research suggests is beneficial to both the individual and society.

The Strength Model of Self-Regulation and Mindfulness

Mindfulness has been defined as a receptive attention to and awareness of present events and experience (Brown & Ryan, 2003). A host of benefits have been associated with increased mindfulness such as improved psychological well-being and physical health, better relationship quality, and improved self-regulation (see Brown, Ryan, & Creswell, 2007). Overall, mindfulness has been shown to facilitate healthy and adaptive human functioning across several domains. Following Masicampo and Baumeister (2007), we suggest that there are two areas where the distinction between self-regulatory processes and mindfulness requires attention. First, some conceptual overlap between self-regulation exercise and mindfulness interventions is addressed. Second, the possibility of a bidirectional relationship between self-regulation and mindfulness is examined.

As discussed previously, the strength model of self-control suggests that self-control may operate like a muscle. Research shows that when

self-control is consistently exercised, one's general capacity for self-control increases (gets stronger). An increase in self-control ability has been strongly associated with improvements across a wide range of areas related to well-being. It is possible, then, that mindfulness interventions are a type of self-control exercise. The mindfulness interventions discussed by Brown et al. (2007) have similar characteristics to some of the self-control procedures used in psychological experiments. For example, the mindfulness-based stress reduction procedure involves participants focusing their awareness on thoughts or a specific image for over an hour in a daily exercise routine. Some self-control procedures involve similar attention control tasks (e.g., Gailliot, Baumeister et al., 2007; Vohs, Baumeister, & Ciarocco, 2005). One of these tasks requires participants to watch a silent, 6 min video of a woman speaking, which also has words popping up in the corner. Some participants were instructed to not look at the words, and thus to focus their attention on a specific feature. Holding attention during this 6 min task despite a series of distracting stimuli was enough to induce self-control depletion. Hence, it appears that the awareness control exercises used in mindfulness interventions may be a similar, but longer lasting, type of attention control task used in self-control research.

Other types of mindfulness interventions require participants to consciously monitor and control their physical movements. For example, Hanh (1976) suggests one way to increase mindfulness is to move in slow motion while doing common household tasks and fully focus your attention on the task. This practice is similar to exercises used to increase self-control ability that requires participants to monitor their posture (Muraven et al., 1999) or use their nondominant hand for common daily tasks such as brushing teeth or opening doors (Gailliot, Baumeister et al., 2007). The procedures proposed by Hanh and the self-control researchers require people to engage in common tasks in unusual ways that require conscious control.

Brown et al. (2007) suggest that those with higher dispositional mindfulness have increased

well-being and better self-control ability. However, it is also possible that successful self-control leads to increased mindfulness and well-being. One route by which increased self-control could lead to mindfulness is through goal regulation. An important component of entering a mindful state is achieving some peace of mind or clarity of thought. Unwanted worry or anxiety deriving from uncompleted or unplanned tasks may be a distraction and hinder such clarity of thought. It is possible, then, that those who have successful goal management and regulation (i.e., self-control) have a greater disposition to enter mindful states.

Other research has found that engaging in mindfulness meditation can counteract self-control depletion. Mindfulness meditation consists of blocking out distractions and focusing one's attention on the current moment. A recent study by Friese, Messner, and Schaffner (2012) had some depleted participants mindfully meditate for 5 min before a second self-control task. It was found that depleted participants who engaged in a brief session of mindfulness meditation performed just as well on the second task as did those who were not depleted. The authors suggest that mindfulness meditation may counter typical depletion effects because it increases self-awareness and feelings of relaxation. In this experimental design, depleted participants who meditated (compared to those who did not) presumably exerted additional attention control before the second task. Despite this, those who meditated still outperformed their non-meditating depleted counterparts. It is possible, then, that there are unique features of mindfulness that improve self-control.

Self-control and mindfulness interventions have a number of features in common. Both have similar procedures, execution, and require participation in daily exercises over extended periods of time. Both also involve regulating one's thoughts or behaviors. Self-control and mindfulness interventions produce similar results related to improving physical and psychological well-being. Furthermore, it is not exclusively the case that increased mindfulness causes increased self-control. Mindful states may be most accessible to individuals who already display a high degree of

self-control. Therefore, future research should continue to investigate the extent to which the benefits of mindfulness interventions are unique to specific aspects of mindfulness such as nonattachment and metacognitive insight, and the extent to which they are a result of general self-regulatory processes.

Concluding Remarks

Successful self-control is a vital characteristic that contributes to well-being in a variety of domains. This chapter summarized the strength model of self-control, which states that the ability to self-regulate relies on limited resource. Research has consistently shown that after completing an initial self-control task, performance on subsequent self-control tasks is impaired. Another aspect of the strength model of self-control suggests that self-control resembles a muscle. With regular exercise and practice, one's capacity for self-control can increase.

Mindfulness is an important and useful area of research that is receiving an increasing amount of attention. Mindfulness is associated with increased well-being in life across a range of domains (see Brown & Ryan, 2003). Self-control exercises and mindfulness interventions appear to have some features in common and there is likely a bidirectional relationship between mindfulness and self-regulation. Future research on mindfulness should consider any possible theoretical overlap with self-regulation and clarify the distinction between them.

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