



Do Demanding Conditions Help or Hurt Self-Regulation?

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Abstract

Although everyday life is often demanding, it remains unclear how demanding conditions impact self-regulation. Some theories suggest that demanding conditions impair self-regulation, by undermining autonomy, interfering with skilled performance and working memory, and depleting energy resources. Other theories, however, suggest that demanding conditions improve self-regulation by mobilizing super-ordinate control processes. The present article integrates both kinds of theories by proposing that the self-regulatory impact of demanding conditions depends on how people adapt to such conditions. When people are action-oriented, demanding conditions may lead to improved self-regulation. When people are state-oriented, demanding conditions may lead to impaired self-regulation. Consistent with this idea, action versus state orientation strongly moderates the influence of demands on self-regulatory performance. The impact of demanding conditions on self-regulation is thus not fixed, but modifiable by psychological processes.

Demanding conditions are pervasive in everyday life. At the workplace, employees need to stay abreast of rapid technological innovations and deal with constant pressures towards increased efficiency and productivity. In educational settings, students must meet high standards of academic excellence, often while performing low-paying jobs to cover high tuitions and while taking care of their family members. Even among friends, there are always emails to be responded to, birthdays to be remembered, meetings to be arranged, favors to be returned, along with countless other duties and obligations.

Given that demanding conditions are exceedingly common, it is important to understand how people can most effectively deal with such conditions. Unfortunately, psychological theories offer seemingly contradictory insights into this matter. Some influential theories propose that demanding conditions are likely to undermine self-regulation (Baumeister & Showers, 1986; Beilock, Kulp, Holt, & Carr, 2004; Deci & Ryan, 2000; Muraven & Baumeister, 2000). However, other theories suggest that demanding conditions lead people to marshal their self-regulatory resources, resulting in enhanced motivation and self-regulation (e.g., Botvinick, Braver, Barch, Carter, & Cohen, 2001; Brehm & Self, 1989; Trope & Fishbach, 2000). These different theories have very different practical implications. If demanding conditions undermine self-regulation, people will be best off by avoiding demanding conditions. By contrast, if demanding conditions facilitate self-regulation, people may be advised to seek out demanding conditions whenever they can.

In the present article, we develop an integrative theoretical analysis of how demanding conditions influence self-regulation. In what follows, we begin by taking a closer look at the basic ways in which demanding conditions might help or hurt self-regulation. Next, drawing upon action control theory (Kuhl, 1984, 1994a), we propose that the self-regulatory impact of demanding conditions depends on people's mode of adapting to these

conditions. When people are action-oriented, demanding conditions are likely to facilitate self-regulation. When people are state-oriented, demanding conditions are likely to impair self-regulation. We then review evidence that action versus state orientation moderates the impact of demands on self-regulation. Finally, we state our main conclusions and consider avenues for future research.

Demanding Conditions Can Hurt Self-Regulation

We use the terms “self-regulation” and “demanding conditions” broadly in the present context, because we seek to identify broad patterns in the relation between these variables. The term “self-regulation” denotes the psychological capacity that allows people to bring their thoughts, feelings, and actions in line with abstract standards, goals, or values (Baumeister, Schmeichel, & Vohs, 2007; Carver & Scheier, 1998). The prototype of self-regulation involves conscious and effortful control of behavior. Nevertheless, our use of the term also subsumes more automatic processes that support goal-directed action (e.g., Förster & Jostmann, forthcoming; Koole & Jostmann, 2004; Shah, 2005; Trope & Fishbach, 2000).

Likewise, we use the terms “demanding conditions” or “demands” to refer to a broad array of circumstances under which goal-directed behavior becomes difficult. These include cognitive difficulties (e.g., complexity, working memory load), motivational difficulties (e.g., boredom or passivity), implementational difficulties (e.g., delays, competing impulses, or distractions), or any combination of these. What these various conditions have in common is that they involve a shift from behavioral routines towards actions that are guided by explicit intentions and plans. This way of conceiving demanding conditions is grounded in theories of human action control (Ach, 1910; Gruber & Goschke, 2004; Kuhl, 1985).

Undermining autonomy

A first way in which demanding conditions may impair self-regulation is by undermining people’s autonomy. Demanding conditions often involve activities that are low in intrinsic interest (e.g., doing one’s homework), which are performed to obtain some kind of reward (e.g., money, praise) or long-term benefit (e.g., increased social standing). Proponents of self-determination theory (Deci & Ryan, 2000) have suggested that focusing people on external values and directives may lead people away from self-endorsed values and interests. Demanding conditions may thus undermine autonomous self-regulation. According to self-determination theory, autonomous self-regulation is more adaptive than externally directed self-regulation, because the former requires less inner conflict and inhibition of competing motivational tendencies. Moreover, demanding conditions may keep people from fulfilling intrinsic psychological needs for autonomy, competence, and relatedness, which are essential to well-being according to self-determination theory.

Many tests of self-determination theory have focused on the effects of monetary rewards on intrinsic motivation (Deci, Koestner, & Ryan, 1999). Relevant studies have confirmed that monetary rewards often undermine intrinsic motivation, as assessed through self-report and free-choice task engagement. Undermining effects are particularly pronounced when rewards are administered in a way that makes people feel as if they are externally controlled, like pawns. Similar effects have been observed for other demanding conditions like surveillance, competition, and deadlines (Deci & Ryan, 2000). These kinds of demanding conditions have further been shown to lower emotional well-being, creativity, and complex problem solving (for a review, see Deci & Ryan, 2000). Finally, demanding

conditions (i.e., performance-contingent rewards) lead to poorer performance on self-regulation tasks, such as regulating one's emotions or overriding habitual responses (Muraven, Rosman, & Gagné, 2007). Overall, there is converging evidence that demanding conditions can undermine autonomous self-regulation (see Ryan & Deci, 2008, for an overview).

Choking under pressure

A second way in which demanding conditions may impair self-regulation is by promoting "choking under pressure". Choking is a paradoxical phenomenon in which raising the importance of success leads people to perform more poorly than might be expected given their level of skill (Baumeister & Showers, 1986; Beilock & Carr, 2001). Although choking occurs presumably in many performance contexts, some of the most dramatic examples have been observed in high-pressure sports settings, such as penalty kicks in soccer (Dohmen, 2008; Jordet, 2009) or championship games (e.g., Wright, Voyer, Wright, & Roney, 1995).

The likelihood of choking increases under conditions of heightened self-awareness, which leads people to control skilled processes in a sequential, step-by-step manner (Baumeister & Showers, 1986). Attention at this step-by-step level disrupts the execution of well-learned or proceduralized skills (Beilock & Carr, 2001). Indeed, choking effects emerge readily in tasks that depend on well-rehearsed sensori-motor skills (Baumeister & Showers, 1986; Beilock & Carr, 2001). Choking patterns have further been documented in archival studies of sports finals (Wright, Jackson, Christie, McGuire, & Wright, 1991; Wright et al., 1995).

Choking may also lower intellectual performance, such as math tests (Beilock et al., 2004) and categorization tasks (Markman, Maddox, & Worthy, 2006). A likely explanation is that performance pressure and other demands trigger distracting thoughts and worries, which use up working memory resources. Indeed, performance pressure has been found to lower performance on tasks that make high demands on working memory (i.e., explicit hypothesis testing), but not on tasks that make low demands on working memory (i.e., information-integration tasks; DeCaro, Rotar, Kendra, & Beilock, 2010; Markman et al., 2006; Schmader & Johns, 2003). Moreover, interventions that alleviate pressure-induced worries (e.g., talking aloud) reduce the likelihood of choking during intellectual tasks (DeCaro et al., 2010).

Regulatory depletion

A third way in which demanding conditions may impair self-regulation is by wearing people out. According to an influential account, self-regulation functions like a muscle that draws upon limited energy resources (Muraven & Baumeister, 2000). People's self-regulatory resources may therefore become depleted after an initial act of self-regulation. In line with the regulatory depletion model, performing a demanding self-control task in one domain (e.g., emotional suppression) often leads to impaired self-control in another, ostensibly unrelated domain (e.g., breaking one's diet, Vohs & Heatherton, 2000).

A meta-analysis of 83 studies yielded robust evidence for regulatory depletion effects, which were found to have a medium-to-large effect size (Hagger, Wood, Stiff, & Chatzisarantis, 2010). Regulatory depletion can be induced by many different self-control tasks, including voluntary control of emotion, thoughts, impulses, and attention. Moreover, regulatory depletion may lower performance on the same broad range of self-control tasks. In line with the depletion model (and everyday experience), the meta-analysis revealed that people experience self-control as highly effortful. Moreover, exerting

self-control increases subjective fatigue and lowers blood glucose levels, the brain's energy source (Gailliot & Baumeister, 2007).

The self-control tasks studied in depletion research are in many ways representative of everyday life activities, such as controlling stereotypes (Gordijn, Hindriks, Koomen, Dijksterhuis, & van Knippenberg, 2004), self-presentation (Vohs, Baumeister, & Ciarocco, 2005), or refraining from tasty but fattening food (Vohs & Heatherton, 2000). Remarkably, depletion research suggests that performing these kinds of tasks for as little as 5–10 minutes can result in marked drops in self-regulatory efficiency. Consequently, regulatory depletion may be a frequent cause of self-regulatory failure in everyday life.

Summary

Several well-established theories and empirical observations suggest that demanding conditions can impair self-regulation. Three mechanisms are commonly cited for the adverse self-regulatory effects of demanding conditions. First, demanding conditions may undermine autonomous self-regulation by directing people towards extrinsic directives. Second, demanding conditions may lead people to choke under pressure, as evidenced by disruptions of skilled performance and working memory deficits. Third, demanding conditions may deplete of limited energy resources that are needed for effective self-regulation.

Demanding Conditions Can Help Self-Regulation

It seems incontrovertible that demanding conditions can have adverse effects on self-regulation. But is this always the case? Anecdotal sources suggest that demanding conditions sometimes bring out the best in people. For instance, the German philosopher Friedrich Nietzsche (1889/1998, p. 18) famously contended that “whatever does not kill me, makes me stronger”. Along similar lines, a hit song by Billy Ocean in the 1980s boasted that “When the going gets tough, the tough get going”. Comparable themes can be found throughout popular inspirational stories and movies, in which protagonists excel despite seemingly insurmountable obstacles. Are such Nietzschean (or Oceanic) themes misguided? Or do they have a kernel of truth? Indeed, can demanding conditions have beneficial effects on self-regulation?

Ach's law of difficulty and effort mobilization

Among the earliest scholars to recognize possible self-regulatory benefits of demanding conditions was Narziss Ach, a pioneering researcher in the psychological analysis of the will in the early twentieth century. Ach (1905) developed an experimental paradigm to assess the psychological transitions that occur during willful action (see Morsella et al., 2009; for a modern analog). In this paradigm, participants were instructed to override previously learned associations and provided detailed reports of their subjective experiences during the task. By painstakingly studying these reports, Ach (1910) derived his “law of difficulty”, which states that increases in task difficulty lead to enhanced engagement of willpower. Hillgruber (1912, cited in Heckhausen & Heckhausen, 2008), a student of Ach's, experimentally confirmed the law of difficulty, by demonstrating that increases in task difficulty can lead to subsequent improvements in task performance.

Decades later, from the 1980s onwards, the notion that difficulties can lead to enhanced performance reemerged in research on effort mobilization (Brehm & Self, 1989; Wright & Kirby, 2001). This line of work showed that increases in task difficulty

lead people to invest greater efforts into the task, provided that people are sufficiently motivated (see Gendolla & Richter, 2010; for a recent overview). In many relevant studies, effort mobilization was indexed by cardiovascular activity such as heart rate or blood pressure. The same cardiovascular responses become increased after people perform a self-regulatory task (Segerstrom & Solberg Nes, 2007). Consequently, effort mobilization theory is highly compatible with the notion that people dynamically adapt their self-regulatory efforts in response to increases in demands.

Conflict adaptation

Similar dynamic adaptation processes have become widely studied by contemporary cognitive psychologists. Interest in this area was sparked by findings that people become better able to resolve a conflict between competing response tendencies after encountering a similar response conflict on a preceding trial (Gratton, Coles, & Donchin, 1992). Such conflict adaptation effects have been observed in a wide range of cognitive tasks (e.g., Egner & Hirsch, 2005; Fischer, Dreisbach, & Goschke, 2008). Moreover, conflict effects cannot be reduced to low-level perceptual processes such as repetition priming (Freitas, Bahar, Yang, & Banai, 2007; Verbruggen, Notebaert, Liefoghe, & Vandierendonck, 2006). The most widely accepted explanation for these findings is that people flexibly and dynamically adjust the amount of cognitive control that people need for the performance of specific tasks.

An influential account of the dynamic adaption of cognitive control is conflict monitoring theory (Botvinick et al., 2001). According to the theory, the human mind continually monitors for conflicts in information processing that give rise to incompatible response tendencies. When a conflict is detected, this information is passed to a second, regulatory system, which implements the desired response while inhibiting the incompatible one. Conflict monitoring theory can explain a wide range of behavioral findings in cognitive control tasks. Furthermore, neuro-imaging studies indicate that conflict monitoring is supported by the anterior cingulate cortex, whereas conflict resolution is controlled by the prefrontal cortex (e.g., Kerns et al., 2004). This neurobiological evidence further supports conflict monitoring theory.

Cognitive control and self-regulation involve similar psychological processes and overlapping neurobiological networks (Robinson, Schmeichel, & Inzlicht, 2010). As such, it seems plausible that people can dynamically adjust their self-regulatory efforts to increases in demands in the manner suggested by cognitive control theories. In line with this, research has shown that presenting dieters with strong temptations (e.g., a delicious chocolate cake) leads to better diet adherence than presenting them with weak temptations (e.g., a factual description of chocolate; Kroese, Evers, & De Ridder, 2011). Strong temptations may thus paradoxically support self-regulation by leading people to mobilize stronger counteractive control processes (Trope & Fishbach, 2000). Similar conflict adaptation processes have been observed among people attempting to inhibit racial stereotypes (Amodio, Kubota, Harmon-Jones, & Devine, 2006) and people who are controlling their anger (Wilkowski, Robinson, & Troop-Gordon, 2010).

Reversed depletion effects

Conflict adaptation effects have received further support from research using the regulatory depletion paradigm (Muraven & Baumeister, 2000). One provocative set of experiments (DeWitte, Bruyneel, & Geyskens, 2009) observed that the regulatory depletion

pattern only emerged when two consecutive self-regulatory tasks require different control processes (e.g., dieting versus task persistence). By contrast, initial engagement in self-regulation led to *enhancements* in self-regulation when two consecutive self-regulatory tasks required similar control processes (e.g., not eating candy and not eating chocolate). Presumably, greater similarity between self-regulatory tasks facilitates conflict adaptation processes, and thus reverses the regulatory depletion effect.

Reversed depletion effects have also emerged in research on learned industriousness (Converse & DeShon, 2009; see also Eisenberger, 1992). Learned industriousness theory proposes that effort exertion may eventually become self-reinforcing, as people learn that their efforts are usually rewarded. Prior work has shown that such learned industriousness effect become stronger when people perform a greater variety of tasks. Thus, performing a series of difficult self-regulatory tasks may enhance self-regulatory performance in subsequent tasks, provided that people have sufficient learning experiences. Consistent with this, experiments have shown that adding a third task to the standard depletion paradigm facilitates subsequent self-regulation (Converse & DeShon, 2009). Prolonged engagement in self-regulatory tasks may thus lead to improvements in self-regulatory performance.

Summary

Converging theories and empirical observations suggest that demanding conditions may have a beneficial influence on self-regulation. Early work by Ach in the 1900s observed that increases in task difficulty can lead to increases in volitional exertion. In more recent years, research has confirmed that people can flexibly boost their control efforts in dealing with conflicting response tendencies. Finally, regulatory depletion effects reverse under certain conditions, such as when consecutive self-regulation tasks are very similar or when people have to perform a great variety of self-regulatory tasks.

Action Control Theory

The evidence reviewed so far suggests that demanding conditions sometimes help and at other times hurt people's capacity for self-regulation. These different self-regulatory effects of demands were observed within different theoretical and methodological paradigms. As such, the helpful versus hurtful effects of demands do not necessarily contradict each other. Nevertheless, the different paradigms have so far made little contact with another, so that it is hard to say when one should expect demands to have helpful or hurtful effects on self-regulation. As a first step towards a theoretical integration, we suggest that the psychological impact of demanding conditions is not direct, but rather depends on how people are adapting to these demands.

What determines how people adapt to demanding situations? In addressing this question, we draw from action control theory (Kuhl, 1984, 1994a), a theoretical perspective that is rooted in the tradition of German will psychology (Ach, 1910; Gollwitzer, 1993; Heckhausen & Kuhl, 1985). Action control theory originally sought to explain what lay-people refer to as "willpower", that is, how people are able to translate their intentions into action. During the 1980s, when action control theory was first conceived, most scientific psychologists were extremely reluctant to theorize about anything related to the will (a reluctance that continues to the present day and age, see Baumeister, 2008). Furthermore, sophisticated methods for empirically investigating volitional processes still had to be developed, and many of these have only become available in recent years. As a result, key ideas from action control theory are now beginning to find their way to

self-regulation research. Indeed, most of the research that we will discuss in subsequent sections belongs to this new generation of action-theoretical research.

According to action control theory, people can adapt to demanding situations in either an action- or state-oriented manner. When people are action-oriented, they adapt positively to increases in demands, which means that high-level goals and intentions come to exert a greater influence (from the “top down”) in guiding ongoing behavior. By contrast, when people are state-oriented, they adapt negatively to increases in demands. As a consequence, high-level goals and intentions are prevented from guiding ongoing behavior among state-oriented individuals, even when these goals and intentions are highly accessible in working memory. Under demanding conditions, state-oriented individuals’ behavior will therefore be more stimulus-driven¹ (from the “bottom up”) and guided by behavioral routines and elementary perceptions.

Whether people are action- versus state-oriented depends on situational and dispositional factors. Situational factors (e.g., positive feedback) may signal to people that additional efforts are likely to pay off. Another important factor is formed by people’s prior learning histories. Some individuals may have social interaction partners who are either highly protective or highly controlling, so that they will experience few challenges or are prone to become overexerted. Such experiences teach individuals to use their self-regulatory capacity optimally under relaxing conditions, and to adapt negatively to demanding situations. As a result, these individuals will develop a chronic disposition towards state orientation. By contrast, other individuals may learn how to use their self-regulation capacity especially in situations that are challenging and fraught with difficulties. Individuals may implicitly learn this when social interaction partners provide them with ample opportunities to initiate activities that are optimally challenging and engaging. Such experiences likely teach individuals to adapt positively to demanding situations. The latter individuals are likely to develop a chronic disposition towards action orientation.

Kuhl (1994b) and associates have developed a self-report scale to assess individual differences in action versus state orientation. This scale distinguishes between several facets (for psychometric analyses and validation, see Diefendorff, Hall, Lord, & Streat, 2000; Kuhl, 1994b; Papantoniou, Moraitou, Dinou, & Katsadima, 2010). In the present article, we focus on the facet that relates to demanding situations. Table 1 displays illustrative items of the subscale assessing demand-related action versus state orientation. Over 60 published studies to date have supported the validity of the scale (Koole, Jostmann, & Kuhl, forthcoming). These studies have shown that the effects of action versus state orientation are empirically separable from at least 24 individual-difference variables. Individual differences in action versus state orientation thus seem to capture unique behavioral variance that is not explained by other personality variables.

To get a better sense of the psychological significance of action versus orientation, it is useful to consider how the construct differs conceptually from other personality variables. First, action versus state orientation relates to the person’s capacity to enact difficult intentions. This conception differs from approaches that equate action orientation with the tendency to display any kind of action (e.g., Galinsky, Gruenfeld, & Magee, 2003). Within our framework, such general action readiness relates to impulsivity rather than action orientation (see Logan, Schachar, & Tannock, 1997). Second, we do *not* assume that action-oriented individuals are generally superior at self-regulation than state-oriented individuals. In this sense, action orientation differs from constructs like working memory capacity (Baddeley, 1992) and trait self-control (Tangney, Baumeister, & Boone, 2004). Indeed, action-oriented individuals should only display better self-regulation than state-oriented individuals in highly demanding contexts. In low-demanding contexts, state-oriented

Table 1 Illustrative Items of the Scale Assessing Demand-Related Action versus State Orientation (Kuhl, 1994b; Action-Oriented Responses are Marked with an Asterisk)

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1. When I know I must finish something soon
 - A. I have to push myself to get started
 - B. I find it easy to get it done and over with*
 2. When I am getting ready to tackle a difficult problem
 - A. It feels like I am facing a big mountain that I don't think I can climb
 - B. I look for a way that the problem can be approached in a suitable manner*
 3. When I have to solve a difficult problem
 - A. I usually don't have a problem getting started on it*
 - B. I have trouble sorting out things in my head so that I can get down to working on the problem
 4. When I have work to do at home
 - A. It is often hard for me to get the work done
 - B. I usually get it done right away*
 5. When there are two things that I really want to do, but I can't do both of them:
 - A. I quickly begin one thing and forget about the other thing I couldn't do*
 - B. It's not easy for me to put the thing that I couldn't do out of my mind
-

Options marked with an asterisk (*) refer to an action-oriented response.

individuals may display equal or even better self-regulation than action-oriented individuals (see Koole, Kuhl, Jostmann, & Vohs, 2005, on the hidden benefits of state orientation).

Third, action-oriented individuals are *not* assumed to be less sensitive to increases in demands than state-oriented individuals. In this sense, action versus state orientation differs from traits like hardiness (Kobasa, Maddi, & Kahn, 1982) and classic personality dimensions such as extraversion and low neuroticism (Eysenck & Eysenck, 1985), which assess individuals' (low) sensitivity to positive and negative events. Indeed, we assume that action- and state-oriented individuals are both sensitive to changing demands, even though they adjust their self-regulatory functions in opposite ways. A counter-intuitive implication of this notion is that conditions that are sufficiently relaxing may actually inhibit self-regulation among action-oriented individuals. As Julius Kuhl, the originator of action control theory, likes to joke, "The worst thing you can do to action-oriented individuals is to be nice to them" (J. Kuhl, personal communication).

Summary

The self-regulatory impact of demanding conditions may depend on people's mode of adapting to these conditions. People are likely to develop a chronic mode of adapting to demanding conditions as a result of socialization experiences. When people are action-oriented, demanding conditions lead to increases in self-regulatory efficiency. When people are state-oriented, demanding conditions lead to decreases in self-regulatory efficiency. Individual differences in action versus state orientation can be reliably and validly assessed through self-report and are conceptually and empirically distinct from other personality variables.

Self-Regulation under Demanding Conditions: The Moderating Role of Action versus State Orientation

A central prediction of our theoretical analysis is that action versus state orientation should moderate the self-regulatory impact of demanding conditions. The predicted

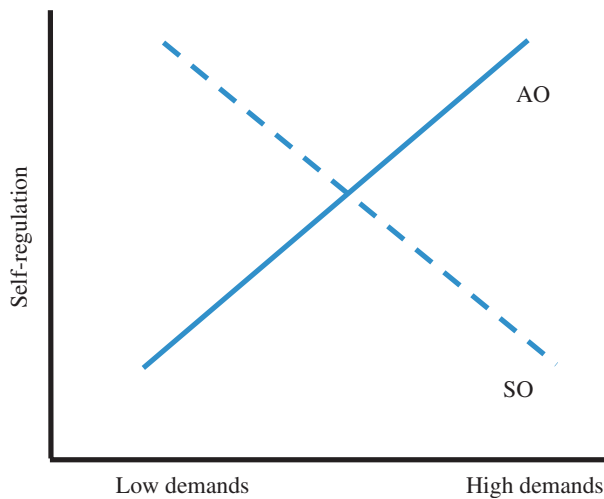


Figure 1 Expected influence of demands on self-regulation for action-oriented (AO) and state-oriented (SO) individuals.

effects are graphically displayed in Figure 1. As the figure shows, we predict that demanding conditions influence action- versus state oriented individuals in opposite ways. Specifically, demanding conditions should facilitate self-regulation among action-oriented individuals, while interfering with self-regulation among state-oriented individuals.

The effects of demanding conditions among action- versus state-oriented individuals may not be perfectly symmetrical in any given study. First, there exists no common metric on which demands can be compared. As a result, some studies may induce more severe demands than others, leading to corresponding differences in the effects of action versus state orientation. Second, empirical measurements may not always fully capture the underlying self-regulatory dynamics. Demands sometimes appear to influence only state-oriented individuals, while leaving action-oriented individuals unaffected (e.g., Baumann & Kuhl, 2005). However, what on the outside looks like stability may actually result from a highly dynamic regulation at a microprocess level (i.e., processes occurring within a fraction of a second; see also Leipold & Greve, 2009). This asymmetry is most likely to occur when measurements are made on higher levels of aggregation (e.g., complex behavior or long-term outcomes). Such aggregated measures may obscure the active self-regulatory processes of action-oriented individuals.

In short, because of methodological differences, the precise shape of the interaction between demands and action versus state orientation likely varies somewhat across studies. Nevertheless, we predict that demands have relatively more harmful self-regulatory effects among state-oriented individuals and relatively more helpful effects among action-oriented individuals.

Losing versus gaining autonomy

As noted earlier, one important way in which demanding conditions may harm self-regulation is by undermining people's autonomy (Deci & Ryan, 2000). Koole (2004) investigated whether this effect is moderated by action versus state orientation. In this study, participants were offered monetary rewards for performing an arithmetic task. In a high

demanding condition, the rewards were contingent upon participants' upcoming arithmetic performance. In a low demanding condition, the rewards were not contingent upon upcoming performance. Before the arithmetic task, participants completed a task that assessed their implicit self-evaluations (see Hetts, Sakuma, & Pelham, 1999). The results showed that the demand induction led action-oriented participants to display significantly more autonomous implicit self-evaluations. State-oriented participants displayed a trend in the opposite direction, but this trend was not statistically significant. Action versus state orientation did not moderate implicit self-evaluations in the domains of relatedness and competence. Thus, action orientation had a specific autonomy-shielding role under demanding conditions.

According to self-determination theorists, demanding conditions may lead people to ignore basic psychological needs. Baumann, Kaschel, and Kuhl (2005, Study 1) examined whether action versus state orientation moderates this effect. These researchers assessed how well the contents of participants' life goals mapped on to their achievement needs, as assessed by an implicit motive test. In addition, participants reported on the level of demands in everyday life. Among state-oriented participants, higher reported levels of demands were associated with lower correspondence between life goals and achievement needs. This fits with the notion that increased demands led state-oriented participants to ignore their psychological needs while setting their goals. Indeed, lower correspondence between life goals and achievement needs among state-oriented individuals went together with lower subjective well-being. By contrast, action-oriented participants displayed high correspondence between life goals and achievement needs and subjective well-being, irrespective of how demanding they perceived their circumstances. Action-oriented individuals thus remained in touch with their psychological needs, even under demanding conditions.

A hallmark of autonomous self-regulation is the capacity to pursue intrinsically enjoyable activities (Deci & Ryan, 2000). Baumann and Kuhl (2005) investigated the effects of different task instructions on self-regulation among action- versus state-oriented participants. Participants had to focus on a computer task while ignoring attractive distracters on the screen (a clip of two competing monkeys who either gave or took away virtual money from the participants). When the task instructions were delivered in a demanding manner, state-oriented participants were better at ignoring distracters than when the instructions were delivered in an autonomy-supportive manner. However, this advantage came at a price. When participants could freely decide whether to continue working on the task, demanding instructions led state-oriented participants to display reduced correspondence between task interest and free-choice task engagement. Thus, although demanding instructions yielded short-term performance benefits, they subsequently impaired autonomous self-regulation among state-oriented participants. By contrast, action-oriented participants were not influenced by the different task instructions. Action orientation thus allowed individuals to maintain autonomous self-regulation under demanding conditions.

Choking versus shining under pressure

As discussed earlier, another way in which demanding conditions may harm self-regulation is by promoting choking under pressure (Baumeister, 1984; Beilock & Carr, 2001). A study by Heckhausen and Strang (1988) examined whether action versus state orientation moderates choking effects. In this study, semi-professional basketball players played a standardized basketball track while their performance and physiological arousal were being

monitored. In one condition, the players could play as usual. In another condition, the players were asked to try and break their personal record. When participants played as usual, there were no differences in performance among action- versus state-oriented players. However, when participants tried to break their personal record, state-oriented players showed heightened arousal and performance drops (e.g., lower hit rates, more dribbling errors), whereas action-oriented players maintained normal levels of arousal and performance. Thus, action versus state orientation moderated choking effects on skillful athletic performance.

Besides motor skills, working memory tasks are also susceptible to choking under pressure (Markman et al., 2006; Schmader & Johns, 2003). Jostmann and Koole (2006) examined whether action-oriented individuals may preserve more working memory resources under demanding conditions than state-oriented individuals. In two studies, participants first visualized a demanding or accepting interaction partner, after which they performed a test of their operation spans or their memory for stimuli related to an upcoming scripted activity. Both tests are markers of working memory capacity (Conway et al., 2005; Smith, Persyn, & Butler, 2011). After visualizing a demanding person, state-oriented individuals had significantly poorer working memory than after visualizing an accepting interaction partner. State-oriented individuals thus displayed the familiar choking pattern in their working memory performance. By contrast, visualizing a demanding person led action-oriented individuals to have better working memory than visualizing an accepting interaction partner.

A subsequent study (Kazén, Kaschel, & Kuhl, 2008) examined the effects of action versus state orientation in an event-based prospective memory paradigm, a task that draws upon working memory capacity (Marsh & Hicks, 1998). In the task, participants had to carry out simple actions (e.g., “comb your hair”) upon seeing target action words on a computer screen (e.g., *combing*). The target words were preceded by cues that were either unrelated (e.g., “building”) or related to the action (e.g., “toothbrush” or “hair”). The related cues presumably alleviated the need for active self-regulation in remembering the right action to the target word. High demand levels were operationalized as low positive affect, based on prior research showing that low positive affect inhibits action initiation (Kuhl & Kazén, 1999).

As expected, action versus state orientation only predicted prospective memory after unrelated cues, which invoke the greatest need for self-regulation. The effects of action versus state orientation further interacted with positive affect. Action-oriented individuals were faster to initiate their intended actions when positive affect was low rather than high. By contrast, state-oriented individuals were faster to initiate their intended actions when positive affect was high rather than low. These findings were conceptually replicated in a second study, which used a key-pressing task instead of a prospective memory task, and cognitive load to operationalize demanding conditions. Taken together, there is converging evidence that action versus state orientation regulates working memory resources under demanding conditions.

Depleting versus energizing the self

A third way in which demanding conditions may harm self-regulation is by depleting energy resources (Muraven & Baumeister, 2000). Jostmann and Koole (2007) addressed whether action versus state orientation might moderate such regulatory depletion effects. In three studies, participants performed a Stroop task in which they classified the colors of words on a computer screen. The meaning of the words was either neutral (a string of

X-es), congruent (e.g., the word “blue” appearing in blue ink) or incongruent (e.g., the word “blue” appearing in red ink) with the ink colors. People generally find the task harder (as indicated by slower responses and more errors) when the word meanings and ink colors are incongruent rather than congruent. The latter form of interference is known as the Stroop effect (MacLeod, 1991). Smaller Stroop effects are widely regarded as a marker of self-regulatory efficiency (Hagger et al., 2010).

Jostmann and Koole (2007) created demanding conditions by asking participants to complete a working memory task (Study 1A), increasing the number and difficulty of trials in the Stroop task (Study 2), or providing performance-contingent rewards for an upcoming cognitive task (Study 3). Each of these manipulations is known to induce regulatory depletion (e.g., Muraven et al., 2007; Schmeichel, 2007; Wallace & Baumeister, 2002). Across all three studies, action versus state orientation moderated the impact of demanding conditions. Specifically, among state-oriented individuals, high demanding conditions led to greater Stroop interference than low demanding conditions. Stroop performance among state-oriented individuals thus conformed to the familiar regulatory depletion pattern. By contrast, among action-oriented individuals, high demanding conditions led to smaller Stroop interference than low demanding conditions. The pattern of performance among action-oriented individuals thus indicated a *reversed* depletion effect (see Converse & DeShon, 2009; DeWitte et al., 2009). Action-oriented individuals apparently become invigorated rather than depleted by performing self-regulatory activities.

Dealing with real-life demands

All but one of the foregoing studies used laboratory tasks to induce demanding conditions. It therefore becomes important to ask if action versus state orientation also moderates responses to demanding situations in everyday life. In one study addressing this question, Jostmann and Koole (2008) asked a group of action- versus state-oriented individuals complete a Stroop task and then asked these individuals to rate the demandingness of their life circumstances. As can be seen in Figure 2, state-oriented individuals displayed significantly more Stroop interference to the degree that they perceived their life to be more demanding. By contrast, action-oriented individuals displayed significantly *less* Stroop interference to the degree that they perceived their life to be more demanding. Thus, experienced life demands influenced Stroop interference in the same manner as experimentally induced demands in the Jostmann and Koole (2007) studies. These

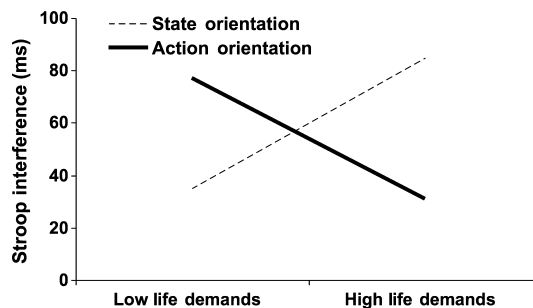


Figure 2 Experienced life demands and Stroop interference among action- versus state-oriented individuals (Jostmann & Koole, 2008).

converging results suggest that experimental procedures capture at least some of the ways in which action- versus state-oriented individuals deal with demands in everyday life.

Field studies have further examined the effects of action versus state orientation in the domains of work, sports, education, and health (for a comprehensive review, see Koole et al., forthcoming). Overall, this work has revealed the same patterns as experimental studies on action versus state orientation. For instance, action orientation predicts better job performance among American employees, particularly for demanding jobs that are low in routine, satisfaction, and involvement (Diefendorff, Richard, & Gosserand, 2006; Diefendorff et al., 2000). Likewise, action orientation is associated with higher effort expenditure, reading comprehension, and math scores among Dutch high school students (Boekaerts & Otten, 1993) and predicts better performance at statistics classes among American undergraduates (Diefendorff, 2004). Finally, action orientation predicts demanding health-maintaining behaviors, such as maintaining a healthy diet (Palfai, 2002) and participation in exercise programs (Kendzierski, 1990).

Summary

Across a broad range of laboratory paradigms and life domains such as work, sports, education, and health, action versus state orientation moderates the impact of demanding conditions on self-regulation. Most studies have observed positive effects of demands among action-oriented individuals and negative effects among state-oriented individuals. Notably, there is some variability in this basic pattern. First, differences between action-versus state-oriented individuals were often most pronounced under high-demanding conditions. This is presumably because the investigated low-demanding conditions tended to be neutral rather than genuinely supportive. Second, well-defined laboratory measures (e.g., the Stroop tasks) seem to show stronger demand-induced benefits of action orientation than complex behavioral paradigms (e.g., basketball performance). We suspect that complex behavioral measures are less sensitive to self-regulatory dynamics at the micro-process level.

Conclusions and Outlook

Do demanding conditions help or hurt self-regulation? In the present article, we have proposed that the self-regulatory effects of demanding conditions depend on how people adapt to these conditions. When people are action-oriented, demanding conditions help self-regulation, by mobilizing self-regulatory resources to deal with increases in demands. When people are state-oriented, demanding conditions hurt self-regulation, by reducing the influence of high-level goals and intentions on behavior.

Detrimental self-regulatory effects of demands have been traditionally investigated by clinical and social psychologists, who have documented undermining effects of external control (Deci & Ryan, 2000), choking under pressure (Baumeister & Showers, 1986), and regulatory depletion (Muraven & Baumeister, 2000). Though compatible with these approaches, the present analysis suggests they may be particularly applicable to state-oriented individuals. Indeed, research has shown that state-oriented individuals are significantly more vulnerable than action-oriented individuals to undermining effects of external control, choking, and depletion. It is important to note, however, that the self-regulatory problems of state-oriented individuals are not general, but arise from their negative adjustment to increases in demands. Indeed, several studies found that state-oriented individuals self-regulate better than action-oriented individuals under supportive (low-

demanding) conditions. State orientation may thus have important self-regulatory benefits, despite the great value that Westerns culture accords to action orientation (cf. Koole, Kuhl, Jostmann, & Finkenauer, 2006; Olvermann, Metz-Göckel, Hannover, & Pöhlmann, 2004).

Beneficial self-regulatory effects of demands have been traditionally investigated by motivation and cognitive psychologists, in explaining such phenomena as willpower (Ach, 1910; Kuhl, 1984), effort mobilization (Brehm & Self, 1989; Gendolla & Richter, 2010), and conflict adaptation (Botvinick et al., 2001). Our analysis is again compatible with these phenomena, while suggesting that they are particularly applicable to action-oriented individuals. Among action-oriented individuals, increases in demands trigger positive adjustment processes that allow them to self-regulate more effectively. In complex tasks, these increases in self-regulatory efficiency may be manifested as stable performance. Nevertheless, more fine-grained measurements clearly show that demands lead action-oriented individuals to increase their self-regulatory efficiency. Action-oriented individuals thus appear to be equally responsive to changing demands as state-oriented individuals, even though the two types of individuals adjust themselves to demands in opposite directions.

Why would action- versus state-oriented individuals adjust themselves in opposite ways to demanding conditions? In addressing this question, recent work has linked action-versus state orientation to basic affect-regulatory processes (Koole & Kuhl, 2007; Kuhl, 2000). As already noted, positive affect provides the motivational energy for the enactment of difficult intentions (Kuhl & Kazén, 1999). In addition, action-oriented individuals are more efficient than state-oriented individuals at up-regulating positive affect under demanding conditions (Koole & Fockenberg, 2011; Koole & Jostmann, 2004). These efficient affect-regulatory abilities allow action-oriented individuals to experience more flow states, experiences of being fully immersed in a task, under demanding conditions (Baumann & Scheffer, 2010). Differences in affect regulation abilities may thus explain why demanding conditions lead to better self-regulation among action-oriented individuals. Consistent with these ideas, a recent study (Ruigendijk, Koole, & Scholte, forthcoming) found that action-oriented individuals have higher white matter density than state-oriented individuals in the hippocampus, a neurological structure that down-regulates negative affect and allows for context-appropriate modulation of behavioral responses (Schmajuk & Buhusi, 1997). Future work should explicate the role of affect regulation in the behavioral effects of action versus state orientation.

Our conjectures about the neurobiological underpinnings of action versus state orientation should not be taken to mean that this disposition is fixed and impervious to social influence. To the contrary, action versus state orientation remains plastic even into late adulthood (Gröpel, Kuhl, & Kazén, 2004). Moreover, action orientation may increase when people move towards a more autonomy-supportive environment (Elbe, Szymanski, & Beckmann, 2005). The social malleability of action versus state orientation opens up the possibility of developing training interventions (see Hartung & Schulte, 1994). The development of such training programs is not only important for applied reasons, but would also represent a methodological advance. To date, almost all research on action versus state orientation has relied on individual difference measures. As a result, it is not possible to draw strong conclusions about the causal significance of action versus state orientation. Training programs may thus provide a new methodological tool for exploring the causal impact of action versus state orientation on self-regulatory functioning.

In practical terms, the present analysis may help teachers, managers, coaches, and other practitioners to optimize how people are dealing with demanding conditions (see also

Kuhl, Kazén, & Koole, 2006). Merely knowing that people have to deal with a demanding situation is not enough to foresee how their self-regulatory performance will be impacted. Practitioners can therefore gain much insight simply by finding out whether people generally deal with demanding conditions in an action- or state-oriented manner. When state-oriented individuals have to face a demanding situation, practitioners may ensure that these individuals receive adequate motivational and emotional support. By contrast, when action-oriented individuals have to face a demanding situation, these individuals may be left to own devices as much as possible. Indeed, practitioners may even set up demanding conditions for action-oriented individuals, to provide them with optimal levels of challenge. Recognizing that demanding conditions may influence different people in different ways may thus allow people to make the most of themselves.

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Short Biographies

Sander L. Koole is an Associate Professor of Psychology at the VU University Amsterdam. He has published more than 60 articles and book chapters on the topics of emotion regulation, self-regulation, and self-esteem. He has co-edited the *Handbook of Experimental Existential Psychology*. His research has been supported by grants from the Netherlands Organization of Scientific Research (NWO) and the Templeton Foundation. He has been a residential fellow of the Center for Advanced Study in Behavioral Sciences at Stanford University. Koole's research was recognized in 2011 by a Starting Grant of the European Research Council, a grant that is awarded to young researchers with the proven potential to become leaders in their field.

Nils B. Jostmann is an Assistant Professor at the University of Amsterdam. He received his PhD in Psychology from VU University Amsterdam, and also did a postdoctoral fellowship there. He has published articles in the top journals of his field, including the *Journal of Personality and Social Psychology*, the *Journal of Experimental Psychology: General*, and *Psychological Science*. He has investigated personality, affect regulation, working memory and control processes, as well as the role of body feedback in dealing with demands. His current research focus is on self-regulation and motivation. He is particularly interested in how people come to enjoy what they do despite or perhaps because of demanding circumstances.

Nicola Baumann's research is located at the intersection of personality, motivation, cognitive, and social psychology. She received her PhD in Psychology from the University of Osnabrück, Germany, and went on to do a postdoctoral fellowship in the Department of Clinical and Social Psychology at the University of Rochester, New York. She is currently a Full Professor of Differential Psychology, Personality Psychology, and Diagnostics at the University of Trier, Germany. Her research focuses on self-regulation and self-determination: personal and social determinants, neuropsychological correlates and health outcomes. Other research interests are terror management, motive-goal congruence, creativity, and flow. On a broader level, she is interested in positive aspects of presumably "maladaptive" traits (e.g., neuroticism), feelings (e.g., frustration), and situations (e.g., demands).

Endnotes

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¹ Our definition of ‘stimulus’ includes both external stimuli like tempting foods and internal stimuli like the perception of hunger or fatigue. Thus, bottom-up processing may enhance the impact of either internal or external stimuli, depending on which kind of stimulus people encounter in the situation.

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