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## “Giving in to Temptation”: Self-Control as a Valuable But Limited Resource?

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### Abstract

Life constantly challenges us with temptations that we have to resist to follow the rules of society and achieve our goals. The strength model of self-control (SC) posits that SC capacity relies on limited mental energy that can be depleted. In the present review article, we analyze and explore past and current research on the SC construct. Departing from different approaches to the conceptualization and operationalization of the SC construct, we review and synthesize the major findings on the strength model of SC and on the ego depletion effect. We also review past and new findings on both the benefits, mainly for life outcomes, and the costs of SC failures. Next, we present and discuss some recent alternative and complementary approaches to current SC perspectives. Finally, we conclude by presenting some theoretical and empirical considerations and implications in an attempt to encourage future research and applied intervention in the broad field of SC.

**Keywords:** Self-control, ego depletion, temptation, mental energy.

## “Ceder à Tentação”: Auto-Controle como um Recurso Valioso mas Limitado?

### Resumo

A vida desafia-nos constantemente com tentações que temos de resistir de modo a seguir as regras da sociedade e alcançar os nossos objetivos. O modelo força de auto-controle postula que a capacidade de auto-controle depende de uma energia mental limitada, que pode ser esgotada. No presente artigo de revisão analisamos e exploramos a investigação passada e atual acerca do constructo de auto-controle. Partindo de diferentes perspectivas da conceptualização e operacionalização em torno do constructo de auto-controle, revemos e sintetizamos os principais estudos do modelo da força do auto-controle, bem como do efeito da depleção do ego. Também revemos estudos passados e atuais acerca dos benefícios, sobretudo nas principais dimensões da vida, mas também para os custos das falhas no auto-controle. A seguir, apresentamos e discutimos algumas perspectivas alternativas e complementares para as abordagens ao auto-controle. Finalmente, algumas considerações e implicações teóricas e empíricas foram

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apresentadas, na tentativa de encorajar a investigação futura e a intervenção aplicada na área geral do auto-controle.

**Palavras-chave:** Auto-controle, “depleção do ego”, tentação, energia mental.

## **“Ceder a la Tentación”: El Autocontrol como un Recurso Valioso pero Limitado?**

### **Resumen**

La vida constantemente nos desafía con tentaciones que tenemos que resistir con el fin de respetar las reglas de la sociedad y alcanzar nuestros objetivos. El modelo de fuerza del autocontrol postula que la capacidad de autocontrol depende de una energía mental limitada, la cual puede llegar a agotarse. En la presente revisión, analizamos y exploramos tanto la investigación pasada como la actual sobre el constructo de autocontrol. A partir de diferentes perspectivas de conceptualización y operacionalización alrededor del constructo de autocontrol, revisamos y sintetizamos los principales estudios sobre el modelo de la fuerza del autocontrol, así como el efecto del agotamiento del ego. También se revisan estudios anteriores y actuales sobre los beneficios, sobre todo en las principales dimensiones de la vida, pero también de cara a los costes del fracaso en el autocontrol. A continuación, presentamos y discutimos algunos enfoques alternativos y complementarios para el abordaje del autocontrol. Finalmente, algunas consideraciones e implicaciones teóricas y empíricas se presentaron buscando fomentar la investigación y la intervención aplicada en el área general del autocontrol.

**Palabras clave:** Autocontrol, “agotamiento del ego”, tentación, energía mental.

Self-control (SC) is considered “the greatest human strength” (Bauer & Baumeister, 2011). Bearing in mind the endless implications of successful and unsuccessful SC to individuals’ lives, the literature has recently witnessed a “boom” in this domain (Hofmann & Kotabe, 2012, p. 775). In everyday life, we are constantly facing situations in which it is necessary to resist the temptation of immediate pleasure or of taking the easiest action, as it might imply long-term costs or be socially inappropriate (Baumeister, Vohs, & Tice, 2007). For instance, we must resist the temptation to eat a sweet, continue to sleep during the morning, or act violently. Indeed, failing to resist temptations and impulses may lead, for example, to crime, teen pregnancy, alcoholism, drug addiction, venereal diseases, or education underachievement, among others (Baumeister & Alquist, 2009; Baumeister et al., 2007). Earlier conceptualizations of SC have been linked mainly with self-regulatory failures, which are associated with individual and social problems, personal difficulties, “bad” behaviors and

habits or, at least, behaviors that have a “bad reputation” (Hofmann, Luhmann, Fisher, Vohs, & Baumeister, 2014). More recent approaches in this research domain have focused on the associations between SC and preventive and more positive life outcomes (e.g., individual achievement and success, well-being, quality of life, and happiness).

Because SC is such a highly valuable resource and skill, this review aims to analyze and provide a conceptual and theoretical overview of the recent research on the SC construct. More specifically, this review is guided by the following goals: (a) define and operationalize the SC construct; (b) present and describe the strength model of SC and the research that supports this theoretical framework; (c) summarize recent research and current findings on the benefits and costs of SC; (d) present and highlight recent alternative or complementary conceptualizations to the strength model; and (e) discuss and suggest some important implications and directions for future studies and psychological interventions in the general field of SC.

## Operationalizing Self-Control

Despite the vast amount of research and literature in the general domain of SC, Hofmann and Kotabe (2012, p. 775) noted that “successful and unsuccessful SC can take many different forms”, suggesting that there remain many unanswered questions regarding what SC is exactly and what should be studied.

Bearing in mind the importance of SC, Baumeister and Heatherton (1996) suggested that SC depends on three main components: standards, monitoring, and strength. Standards include “ideals, goals, or other conceptions of possible states” (Baumeister & Heatherton, 1996, p. 2) that the individual strives to achieve. Without tracking behavior, SC would be impossible; therefore, monitoring is a second important component. In addition, actions to change the self are difficult and demand strength, more colloquially known as willpower (Baumeister & Vohs, 2007). More recently, these authors introduced a fourth ingredient - motivation - arguing that this component is central and necessary to achieve our goals.

Within Baumeister and colleagues’ (2007) recent framework, the terms SC and self-regulation refer to different processes. From this point of view, SC is a conscious, deliberate and effortful subtype of self-regulation. Self-regulation is a broader construct, which involves homeostatic processes (e.g., the regulation of body temperature). From this perspective, SC can be defined “as the capacity to override natural and automatic tendencies, desires, or behaviours; to pursue long-term goals, even at the expense of short-term attractions; and to follow socially prescribed norms and rules” (Bauer & Baumeister, 2011, p. 65). For the purpose of this review, this perspective will serve as the main guide to operationalizing this construct.

Likewise, Fujita (2011) also attempted to clarify this distinction, suggesting that although SC is a type of self-regulation, not all forms of self-regulation necessarily involve SC. This author, as well as other researchers (Baumeister et al., 2007; Duckworth & Gross, 2014; Hagger,

Wood, Stiff, & Chatzisarantis, 2010), argued that SC is a specific self-regulatory challenge that is necessary when the individual’s distal and proximal goals conflict. In addition, the author conceptualized SC as the effortful inhibition of impulses, extending previous literature and pointing to the need to take into account SC efforts without conscious deliberation (e.g., processes involving automatic behaviors, routines, and planning behaviors).

Moreover, other SC definitions have been suggested. For example, Inzlicht and Schmeichel (2012) proposed that SC refers to “the mental capacity individuals have to override or alter their own thoughts, emotions, and behaviors. It relies on controlled processes to regulate urges, to juggle competing goals, and to sustain attention” (p. 450). Similarly, Duckworth and Gross (2014) conceptualized SC as “the capacity to regulate attention, emotion, and behavior in the presence of temptation” (p. 319).

SC capacity is considered to be among the most important dispositional trait structures of the human personality because it allows the necessary flexibility to attain desired goals (Gailliot et al., 2007). Therefore, because SC is essential for following many rules and standards, including moral rules, this construct has also been referred to as the “moral muscle” (Baumeister & Exline, 1999), suggesting the capacity to overcome selfish impulses and act in a socially desirable manner. It is within such a positive approach that likely one of the most comprehensive operationalizations of SC has been recently advanced by Hofmann et al. (2014), who defined this construct as “the ability to override or change one’s inner responses, as well as to interrupt undesired behavioral tendencies (such as impulses) and refrain from acting on them” (p. 1).

Despite some conceptual discussion and different approaches, it seems clear that SC can, in fact, be considered among individuals’ most valuable assets (Hofmann et al., 2014), as it is one of the core human self-regulatory processes and a determinant key to success in several domains of a goal-directed life (Duckworth & Gross, 2014).

## The Strength Model of Self-Control

Folk wisdom has always advocated the concept of willpower as a type of strength or inner energy necessary to resist temptation (Baumeister & Alquist, 2009). However, it was not until recently that the literature shifted from the behavioral and cognitive models to the idea of SC as a form of “energy” (Baumeister & Alquist, 2009). The idea that SC depends on an energy source was early proposed by Baumeister, Heatherton, and Tice (1994), who suggested that SC depends on limited energy. Thus, previous acts of SC deplete the energy for subsequent acts, decreasing individuals’ ability to exert SC. Empirical evidence for this idea was initially derived from two studies, which reported that participants who had to resist the temptation of cookies performed worst in a subsequent SC task when compared to those who did not have to resist any temptation (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Likewise, those who had to regulate their emotions performed worse in a physical stamina task than those who did not have to regulate their emotions (Muraven, Tice, & Baumeister, 1998).

Thus, the term *ego depletion* was used to refer to a state in which SC energy is temporarily weakened or undermined (Baumeister & Alquist, 2009; Baumeister et al., 1998). Across the literature, the ego depletion effect has been consistently documented using different dependent and independent measures and by several research teams worldwide (see de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012, and Hagger et al., 2010, for extensive reviews). For instance, Vohs and Heatherton (2000) found that depleted dieters ate more ice cream and showed less persistence in a cognitive task than non-depleted dieters. A similar study (Kemps, Tiggemann, & Grigg, 2008) demonstrated that individuals craving chocolate showed worse performance on an SC task than those who did not crave chocolate.

Consistently, resisting temptations seems to compromise SC energy in a variety of other addictions, such as smoking (Shmueli & Prochaska, 2009), spending (Vohs & Faber, 2007), alcohol consumption (Muraven, Collins,

& Nienhaus, 2002), and sexual behavior (Gailliot & Baumeister, 2007). Generally, these results support the idea that resisting temptations can reduce individuals’ capacity to control themselves thereafter. Other studies have provided support for the ego depletion effect among other constructs, such as thought suppression (Muraven et al., 1998). A set of studies by Schmeichel (2007) also found that processes of expressing emotions, controlling attention, and inhibiting a dominant response undermined subsequent processes associated with working memory. This demonstrates that several executive control processes seem to share a common energy.

However, does ego depletion always happen? Bearing in mind that SC capacity is essential to human life, it seems implausible that the ego depletion effect would completely expend our ability to exert regulation. Extending previous perspectives, recent research has suggested that individuals may never be completely depleted (Bauer & Baumeister, 2011). Therefore, some studies have focused on how individuals conserve their self-regulatory resources. For instance, participants did not show ego depletion effects on a second task if they were expecting a third task (Muraven, Shmueli, & Burkley, 2006) or when they believed that exerting SC does not affect their performance (Martijn, Tenbült, Merckelbach, Dreezens, & de Vries, 2002). Furthermore, Gailliot and colleagues (2007) found that acts of SC reduced the levels of glucose in the bloodstream, predicting poorer performance in subsequent SC tasks. When participants were given a glass of lemonade with sugar, their levels of glucose were restored, annulling the effects of ego depletion.

Other studies have explored other variables that counteract the ego depletion phenomenon. More specifically, positive emotions (Tice, Baumeister, Shmueli, & Muraven, 2007), self-affirmations (Schmeichel & Vohs, 2009), resting time (Tyler & Burns, 2008), and implementation of intentions (“if-then” statements or plans; Gollwitzer & Oettingen, 2011) also prevented ego depletion. Additionally, motivation has also been shown to decrease ego depletion. For in-



stance, Muraven, Gagné, and Rosman (2008) reported that participants who were intrinsically motivated for the initial SC task showed better performance in the second task compared to participants with extrinsic motivation.

Recent studies have suggested the important role of implicit theories or beliefs about willpower, similar to implicit theories of intelligence or personality. Accordingly to Dweck (1999), individuals may develop malleable or incremental implicit beliefs (believing that it can be changed or improved) of fixed beliefs (it cannot be changed or improved) about a given attribute. In the SC domain, recent studies have found that individuals who believe or were led to believe that their willpower is a limited resource (fixed theories) demonstrated the effects of ego depletion, whereas those who believed that their resources were unlimited (malleable theories) did not show signs of ego depletion (Job, Dweck, & Walton, 2010; Job, Walton, Bernecker, & Dweck, 2013).

In response to these findings, Vohs, Baumeister, and Schmeichel (2012) partially replicated two previous studies that challenged the ego depletion effect, namely when participants were offered an incentive (increased motivation) or when they believed that their SC energy was unlimited (implicit theories). These authors suggested that the impact of motivation and implicit beliefs decreases as ego depletion increases. Vohs and colleagues (2012) argued that SC energy can be depleted to a point that it becomes unbearable to continue performing self-control tasks despite motivation or implicit beliefs.

### Benefits and Costs of Self-Control

SC enables individuals to adjust to the environment by allowing greater behavior flexibility, acting as a mechanism that overrides impulses and current responses in favor of more appropriate behaviors. This flexibility provided by SC capacity also allows individuals to take advantage of the requirements and opportunities present in human social life (Baumeister & Alquist, 2009).

Indeed, research has widely confirmed the benefits of SC. One of the most known and para-

digmatic studies that first provided empirical evidence for SC benefits was the marshmallow test of delay of gratification. The seconds of resistance to the temptation predicted higher school grades and better cognitive and emotional coping in adolescence (Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990). Follow-up studies demonstrated that children who were better able to refrain from eating the marshmallow showed higher educational achievement, higher sense of self-worth, better skills for coping with stress, and less cocaine/crack use in adulthood, especially among those vulnerable to psychosocial maladjustment (Ayduk et al., 2000).

High self-control can bring an array of benefits for the individual and for society, ranging from better health and satisfying relationships to less criminal and aggressive behavior (e.g., Denson, Capper, Oaten, Friese, & Schofield, 2011; DeWall, Baumeister, Stillman, & Gailliot, 2007; Moffitt et al., 2010; Pratt & Cullen, 2000; Salmon, Fennis, de Ridder, Adriaanse, & de Vet, 2014; Sofia & Cruz, 2015; Tangney, Baumeister, & Boone, 2004). Recently, Galla and Wood (2015) observed that adolescents with high SC capacity reported lower stress severity, fewer daily stressors and used more problem-focused coping, buffering emotional reactions to stress. Indeed, a meta-analysis by de Ridder et al. (2012) demonstrated that individual differences in trait SC have an impact on multiple areas of human functioning, not only in positive and adaptive outcomes (e.g., happiness, better grades, more commitment in a relationship and love) but also in negative and less adaptive outcomes (e.g., more binge eating, alcohol use, occasional speeding, and greater propensity to engage in lifetime delinquency). Recently, Finkenauer et al. (2015) also highlighted the role of the depletion of SC strength on several problems associated with family violence (e.g., aggression in families, intimate partner violence, child maltreatment).

Other studies have consistently reported the benefits of SC in achievement contexts, demonstrating that high self-control is associated with academic achievement (e.g., Duckworth & Seligman, 2005; Duckworth, Tsukayama,

& May, 2010), as well as sports performance (e.g., Englert & Bertrams, 2012, 2015; Englert, Zwemmer, Bertrams, & Oudejans, 2015). In another applied context, Daly, Delaney, Egan, and Baumeister (2015) also provided support for the link between childhood SC and unemployment across the life span, particularly in adulthood, suggesting that SC shapes life trajectories of occupational success and rates of unemployment for many generations.

However, SC does not occur without some type of “cost” or additional “price”. SC can be a “tool” or a skill used for both good and bad purposes. Although most individuals’ goals are aligned with general social norms, some individuals may use SC for destructive and antisocial goals. Thus, the costs of SC for society are more related to its use for antisocial goals (Baumeister & Alquist, 2009).

Regardless of the underlying goal, the exertion of SC implies that individuals have to make sacrifices. SC requires, on a daily basis, a great amount of effort to override impulses and desires. As Hofmann, Baumeister, Förster, and Vohs (2012) observed, nearly half of their participants’ desires (47%) conflicted with their goals, values and motivations. Sacrifices are, however, the foundation of SC benefits, as suggested by Baumeister and Alquist (2009). People make sacrifices to achieve a higher goal; this is known as a trade-off.

Delay of gratification is a paradigmatic example of the direct link between these costs and the possible benefits. In the pioneer marshmallow studies (Mischel et al., 1988; Shoda et al., 1990), participants had to choose between an immediate gain and a greater delayed gain. Although there were short-term costs to the delay, the delay increased the benefits in the long run. For instance, academic success is only possible with sacrifices and delay of gratification (e.g., good grades and academic success in the long run). Moreover, the strength model of SC, as cited above, predicts that previous acts of SC weaken the capacity for subsequent SC tasks (Baumeister et al., 1994). Thus, because people have to constantly restrain impulses, habits, desires and temptations to behave in a more appro-

priate manner, their self-regulatory strength is lowered for other actions.

In sum, the benefits associated with SC capacity as an individual difference are unsurprisingly numerous. From an individual and societal perspective, SC seems to be mostly beneficial. A wide range of studies have provided support for its importance for many aspects of the individual and as one of the most important structures underlying performance and success in achievement contexts (e.g., academics and sports), and in other applied fields (e.g., social, health or clinical psychology). However, some costs must also be taken into account, particularly those related to the effort necessary to exert SC. Despite these “costs” and “prices”, trait SC is an “unmixed blessing” because individuals with high trait SC capacity “end up better off in a multitude of ways, as compared to people with low or poor SC” (Baumeister & Alquist, 2009, p. 126).

### **Alternative and Complementary Approaches to Self-Control**

In a recent large meta-analysis, Hagger and colleagues (2010) analyzed 83 studies to understand the effect of ego depletion. The strength model was found to be useful for explaining SC. However, the role of fatigue and motivation on ego depletion should be better explained. According to these authors, ego depletion may also be an effect of subjective fatigue and a reason for subsequent failures. Additionally, even if motivation allows the individual to counteract the effects of ego depletion, it cannot overcome the depletion effects indefinitely.

Therefore, other perspectives have also been posed to extend and explain the ego depletion effect. As described above in the description of the strength model of SC, Gailliot and colleagues (2007) proposed that glucose is the main energy of SC. However, Beedie and Lane (2012) proposed an “alternative”, but not incompatible, explanation for glucose as a source of SC. Therefore, glucose resources may be directed toward different parts of the body depending on the individual’s allocation. This suggests that

self-control failures are not necessarily related to a lack of glucose but to different priorities and goals. In fact, accordingly to Gropel, Baumeister, and Beckman (2014), this view also recognizes the resource depletion hypothesis, stating that individuals have different goals and priorities and direct their glucose resources to other priorities.

Furthermore, Fujita (2011) suggested a dual-motive perspective, according to which SC is the process of pursuing distal rather than proximal motivations when the two compete. In this sense, SC reflects prioritizing more distal over proximal goals when these conflict with each other, such as choosing not to eat dessert in order to lose weight. According to Fujita (2011), because effortful impulse inhibition can be undermined by the ego depletion effect (e.g., Vohs & Heatherton, 2000), it seems plausible that individuals have developed other processes of SC. Thus, SC does not depend on a single potentially fallible process; rather, it includes several processes. By using other strategies, it is possible to proactively anticipate temptations and prospectively implement strategies to avoid SC failures and promote the achievement of distal goals, for instance, adopting strategies to reduce the likelihood of confronting a temptation. In a similar vein, a very recent study by Ent, Baumeister, and Tice (2015) suggested that SC might involve more processes than simply resisting temptations. In line with Fujita's (2011) dual-motive conceptualization of SC, the authors argued that although resisting temptation and inhibiting desires are valuable, avoiding temptations may also be an important key to decreasing self-control failures.

In a similar recent contribution, Inzlicht and Schmeichel (2012) proposed another "way to see" the ego depletion effects that involve attentional and motivational shifts as its "core mechanisms": the process model of ego depletion. According to this model, exerting SC at time 1 (before exerting SC) triggers a pair of interdependent and iterative processes that will reduce SC capacity at time 2 (after exerting SC). These shifts occur because after a previous task, individuals feel less motivated to expend more

effort. Therefore, individuals feel motivated toward instant gratification and more attentive to cues signaling rewards. Instead of a loss in SC energy as suggested before, the undermined capacity of SC after a previous task is a result of shifts in attention and motivation.

In sum, conceptualizing these new approaches as complementary, rather than competing or contradictory perspectives, provides "more room" and encourages future basic and applied investigation of processes involved in SC efforts and self-regulatory failures.

## Implications and Future Directions

We started the present review from the strength model of SC based on the notion of limited resources, which has certainly contributed to our knowledge about how SC processes unfold. However, research counteracting ego depletion (e.g., Muraven et al., 2008; Schmeichel & Vohs, 2009; Webb & Sheeran, 2003) has raised some critics and some unresolved issues throughout the literature, suggesting that alternative explanations or further theoretical extensions should be formulated (e.g., Fujita, 2011; Inzlicht, Legault, & Teper, 2014; Inzlicht & Schmeichel, 2012; Inzlicht, Schmeichel, & Macrae, 2014).

## *Theoretical and Conceptual Implications*

The "new" or more recent alternative perspectives have not been as widely studied as the ego depletion account, suggesting that researchers should attempt to empirically test and replicate them in real-world and ecologically valid contexts. A major strength to note is that these perspectives seem to agree with the idea that previous acts of SC will undermine subsequent acts. Therefore, an attempt to integrate these new perspectives must be a central aim to provide a deeper and full understating of the processes involved in SC. Thus, a critical focus of future research is to clarify which mechanisms, namely, attentional and motivational, are implicated in the ego depletion effect or, at least, in the so-called



SC “refractory period” (Inzlicht, Schmeichel, et al., 2014, p. 5). More specifically, a deeper exploration of how and why ego depletion occurs and other non-resource-based hypotheses are needed, as stated by Inzlicht and colleagues (Inzlicht, Schmeichel, et al., 2014; Inzlicht & Schmeichel, 2012).

Furthermore, Duckworth, Gendler and Gross (2014) recently proposed an adaptation of Gross’s (2008) emotion regulation framework to SC. Thus, SC also involves several strategies organized into five families of sequential phases: situation selection, situation modification, attentional deployment, cognitive change and response modulation. This model suggests “the relative efficiency of strategies that effectively change the strength of desirable and/or undesirable impulses well in advance of direct encounters with temptation” (p. 202). Therefore, future research should also explore the effectiveness of different strategies in different contexts and situations.

Another important line, which could offer a step forward in advancing our knowledge, is the role of motivation (individuals’ values, goal orientations) in SC efforts. For example, Milyavskaya, Inzlicht, Hope, and Koestner (2015) suggested that *want-to goals* (goals that individuals genuinely value and are personally important to them – intrinsic) were associated with less temptation, fewer obstacles in the face of goal pursuit, and fewer and less tempting desires conflicting with the individuals’ important goals. In contrast, *have-to goals* (those that are pursued for external reasons, such as to attain an external outcome or please others) were associated with the perception of more obstacles to goal pursuit, greater effort and more perception of conflicting and tempting desires. This perspective suggests the importance of considering different types of goals rather than solely motivation in general and exploring how different goals affect SC. Thus, more research should consider whether different types of motivation have a different impact on different levels of ego depletion.

Within a different perspective on SC, Tsukayama, Duckworth, and Kim (2012) considered the impact of different domain-specific tempta-

tions (e.g., work, interpersonal relationships, drug, food, exercise, and finances) in both inter- and intra-individual differences. Thus, although the SC was found to be a general capacity, the level of temptation in each domain seems to be domain-specific. Therefore, similarly to other skills (e.g., life skills), the issue of transferability of domain-specific SC skills to multiple domains merits further attention. In a similar vein, Hofmann, Vohs, and Baumeister (2012), using the experience sampling methodology (ESM), focused on how desires/temptations vary across the week and throughout the day. It was observed that a behavior can be more tempting for an individual than for other individuals and that the intensity of this temptation can vary across the week or the day. Therefore, another important pathway to understanding SC is a focus on the level of temptation associated with each domain of life. Presumably, the differences in SC capacity in each domain may be better explained by the subjective level of temptation associated with the domain than by SC capacity in general.

Additionally, there is evidence to suggest that individuals with a better SC capacity are better at avoiding temptations (Hofmann et al., 2012). SC may involve two different components: avoiding temptations and resisting them. In fact, Ent and colleagues (2015) found evidence that individuals with a better SC capacity are better at avoiding temptations, pointing out an important line of studies on SC as a mechanism that enables individuals to avoid temptations.

It is possible that SC involves the development of habits and, therefore, individuals high in SC use less effortful inhibition. Indeed, Galla and Duckworth (2015) found evidence for this hypothesis, demonstrating that SC is related to positive outcomes through the inhibition of temptations and beneficial habits. This finding also indicates the importance of considering the developmental process of “good and beneficial” habits and their role and impact on the association between SC and other more positive markers of adjustment and life adaptation (e.g., positivity, coping efficacy, successful adaptation) in future studies.

In this same way, a promising implication of recent findings concerns the clarification of the relationships between SC, well-being and satisfaction with life as well as the processes involved in the potential causal path from SC to such positive outcomes, particularly in situations of motivational conflicts between goals or in situations of “vice-virtues conflicts” (Hofmann et al., 2014).

### *Methodological and Measurement Implications*

Another still unresolved issue is situated at the measurement level. The development of measures to properly assess SC should also be the aim of future studies (see Duckworth & Kern, 2011, for a review on measurement issues). For example, the understudied role and impact of state (and not only trait) levels of SC merits additional efforts and encourages a new line of future research. As previously advanced by Baumeister and Alquist (2009), to better understand the benefits and costs associated with SC, it is necessary to consider both trait (as a capacity) and state (current efforts) SC.

The SC Scale developed by Tangney and colleagues (2004) has been successfully used in different achievement and applied contexts (e.g., Duckworth, Quinn, & Tsukayama, 2012; Duckworth et al., 2010; Finkenauer, Engels, & Baumeister, 2005). However, some authors have suggested different structures for this measure, particularly its brief form, which considers two main dimensions: the inhibition of impulses and the active pursuit of goals (de Ridder, de Boer, Lugtig, Bakker, & van Hooft, 2011; Maloney, Grawitch & Barber, 2012). Nonetheless, these different structures may reflect cultural aspects of SC. Thus, future additional cross-cultural studies should also take into account cultural variations in SC. Following appropriate procedures to adapt and validate this instrument across different cultures, and using very culturally sensitive measures (particularly in non-English language countries), such studies must be encouraged (see, for example, Borsa, Damásio, & Bandeira, 2012, for guidelines on such a process). Another

way to improve measurement issues, as suggested by Duckworth and Kern (2011), is to combine different SC measures (e.g., self-reports, but also other informant-reports) to strengthen measurement validity.

Additionally, future studies should extend and replicate the role of “individual temptations” in SC by using domain-specific measures, such as the Domain-Specific Impulsivity Scale (Tsukayama et al., 2012), and using ESM techniques or similar methods (e.g., daily or weekly diaries) to capture the inter- and intra-individual variations and dynamics in the levels of temptations (see Bolger, Davis, & Rafaeli, 2003). Interestingly, recent preliminary but well-designed studies (e.g., Berkman, Falk, & Liberman, 2011; Lopez, Hofmann, Wagner, Kelley, & Heatherton, 2014; Tabibnia et al., 2014) have combined and integrated self-report and/or ESM with neuroimaging methods to search for the neural mechanisms behind some regulatory successes and failures as well as neural predictors and correlates of SC in an effort to understand how and why people can or cannot resist some desires (e.g., food) and temptations (e.g., smoking). Certainly, the next decades will show a large field and domain of research studying, with such methodological “arsenal”, the growing struggle between hedonic desires and temptations, on the one hand, and self-regulatory forces such as SC strength, on the other hand. As Hofmann and Van Dillen (2012) discussed, in the search to know how to successfully regulate a world and environments full of very “rich and potent” desires (e.g., food, sex, drugs, internet), such new methodological instruments can contribute to something that is in society’s best interests: “why we want the things we want and how we can best resist the things we wish we would not want” (p. 320).

### *Practical Implications*

Finally, but not least importantly, as Moffitt and colleagues (2010) suggested, SC-based interventions may even reduce several society costs, improving the health, wealth, and crime rate of a nation. The good news for future re-

searchers and practitioners working with individuals at different developmental stages is that SC skills can be developed and maintained in a similar way as other psychological skills that can be taught and learned (e.g., emotional and social skills; Duckworth et al., 2014). Therefore, the design and development of empirically validated psychological interventions, particularly in achievement contexts (e.g., academic, occupational, or sports), but also in other clinical and non-clinical applied fields, may empower individuals and groups with key and core skills for success and a way for promoting superior and exceptional performances and adaptive life outcomes at both individual and team levels. For example, the efficacy of some psychological strategies (e.g., “if-then plans”, implementation intentions, mental contrasting) and its incorporation in psychological programs targeted to counteract the effects of ego depletion, strengthening SC or helping individuals and groups in their goal-striving are well documented (e.g., Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011; Galla & Duckworth, 2015; Gollwitzer & Oettingen, 2011; Mann, de Ridder, & Fujita, 2013).

As Duckworth and colleagues (2014) proposed, SC also involves several different sequential strategies. This perspective can provide more useful and promising avenues toward the development and design of empirically based and cost-effective psychological interventions targeted for different ages and developmental stages. For example, a recent work by Finke-nauer et al. (2015) suggested some examples of intervention programs for improving SC and alleviating family violence and targeted different developmental stages and populations (children, adolescents, and young adults).

### Final Remarks

In sum, our review and analysis of past and current research around the construct of SC can encourage young and future researchers in the pursuit and generation of new ideas and insights in this growing field of psychological science. Implications drawn upon the current research

can be summarized at distinct theoretical, methodological and practical levels (see Table 1). The need for research advances focused more on the causal role of SC on human achievements and life outcomes seems to be particularly important, extending beyond simple association or prediction (Duckworth et al., 2010). By proposing new lines of research, integrating theoretical perspectives, and raising attention to other variables or processes that have an undeniable influence on SC (e.g., motivation and attention, implicit theories, habits, desires and temptations), this review intended to provide an important contribution to a new generation of studies on this “hot” topic. In order to achieve such purpose, a non-limited mindset combined with effective strategies can help individuals, but also researchers, sustain higher and longer levels of SC. As suggested by Job and colleagues (2013), who quoted a well-known William James statement: “people have far greater capacity to exert SC than they may believe” (p. 5).

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**Table 1**  
**Summary of the Main Future Conceptual Directions and Implications for SC Research and Intervention**

Theoretical and conceptual implications
Explore the differential efficacy of strategies that reduce ego depletion and the different levels of depletion that can be surpassed (or not).
Design and implement more ecological and real-context studies.
Deeper exploration of processes involved in “how” and “why” ego depletion occurs.
Clarify the impact of different motivational and attentional mechanisms implicated in the ego depletion effect.
Examine and explore other non-resource based hypotheses.
Consider and analyze the role of general and domain-specific temptations and self-control failures.
Examine the different types and impact of goals ( <i>want-to</i> and <i>have-to</i> ) involved in SC.
Analyze the role of temptation avoidance and the development of “good” and adaptive habits on SC behavior.
Explore the relationships between SC, well-being and life satisfaction in multiple domains of life.
Methodological and measurement implications
Explore the role of state SC, by using reliable new measures (e.g., measures of motivational and attentional processes).
Combine the use of different types of SC measures (e.g., self and other-informant reports)
Further examine the different structures of the SC scale (Tangney et al., 2004).
Consider the cultural differences of SC by following the appropriate procedures, adapting and validating the SC Scale (Tangney et al., 2004) and other new measures across different cultures.
Combine different methodological approaches and technics (e.g., ESM, diaries).
Use neuroimaging methods to search for the neural mechanisms behind regulatory successes and failures, as well as the neural predictors and correlates of SC.
Practical implications
SC strategies can be learned and taught at different stages of the individual Development. .
Designing and developing empirically validated psychological interventions to promote success and positive outcomes in different life domains.
Develop appropriate psychological interventions according to the age and developmental stage.

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