Lay Theories of Willpower

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Abstract

Some people believe that willpower relies on a limited resource and that performing cognitive work (such as using self-control) results in mental fatigue. Others believe that willpower is nonlimited and that performing cognitive work instead prepares and energizes them for more. These differing lay theories of willpower determine whether or not one's self-control performance actually does decrease or increase after use, with only limited-willpower theorists showing a decrease (the ego depletion effect). Due to the self-control requirements of everyday life, willpower theories also predict outcomes across domains of academics, health, goal-progress, interpersonal relationships, and well-being. Generally, limited-willpower theorists' belief in their limited capacity results in poorer outcomes, particularly during times of high demand. By understanding how willpower theories form and function, interventions that encourage nonlimited willpower theories may be created to improve people's performance and well-being.

1 | INTRODUCTION

After doing effortful mental work, people sometimes report being mentally fatigued and have difficulties performing further effortful work, as if they have ran out of willpower (Hagger, Wood, Stiff, & Chatzisarantis, 2010; cf. Hagger et al., 2016). A highly influential theory, the strength model of self-control, addresses this phenomenon by suggesting that the capacity to exert self-control (also called willpower) is a limited resource (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Vohs, & Tice, 2007). This limited resource model states that when someone engages in one self-control task (like resisting delicious cookies), he or she is subsequently less able to exert self-control on a second unrelated self-control task (like persevering on an anagram task). This state has been called *ego depletion*. Self-control is a domain-general process, where one desire (e.g. to eat a cookie, or to quit working on a boring task) is suppressed and overridden by a longer-term, but less immediately appealing goal (e.g. to be a helpful participant by following instructions).

However, engaging in strenuous mental activity does not always result in reduced self-control capacity. Indeed, other theories propose different accounts. The theory of learned industriousness states that when people engage in difficult mental exertion and are rewarded for it, they improve at subsequent self-control (Converse & Deshon, 2009; Eisenberger, 1992; Hickman, Stromme, & Lippman, 1998). Similarly, research on *flow* describes how people can engage in complex and controlled mental work, like writing or playing piano, for an extended period of time without feelings of exertion or fatigue – instead, people feel *in the zone*. The phenomena of learned industriousness and flow, as well as difficulty in reliably replicating the ego depletion effect (Hagger et al., 2016; Lurquin et al., 2016), lead some to question when, and if, self-control is limited at all. This evidence suggests a nonlimited account of self-control, where self-control capacity is only constrained by the needs for sleep, food, and variety.

Not only researchers disagree about whether willpower relies on a limited resource or is nonlimited (Cunningham & Baumeister, 2016; Hagger et al., 2016; Inzlicht, Schmeichel, & Macrae, 2014) – lay people, too, have their own varying beliefs about how willpower works, regardless of whether or not they have consciously thought about the topic. Some people believe that willpower is limited and that mental exertion results in fatigue, while others believe that willpower is nonlimited and that mental exertion can even be energizing. Such commonly-held beliefs are referred to as *lay theories*; these are individuals' theories about how the world works, which provide a framework on which to base judgments, decisions, and actions (Dweck, Chiu, & Hong, 1995). Lay theories about willpower – as well as lay theories about intelligence (Dweck et al., 1995), personality (Chiu & Dweck, 1997), and genetics (Jayaratne et al., 2006), among others – are important because they determine how people experience and react to the world.

Accordingly, what people believe about self-control influences how they approach their goals, interact with others, and, ultimately, predicts their health and well-being. This article describes what lay theories of willpower are, the everyday consequences of these theories, and the ways that willpower theories might operate and change.

2 | WILLPOWER THEORIES MODERATE EGO DEPLETION EFFECTS

People's expectancies about their ability to exert self-control following the exertion of self-control can moderate ego depletion. In an experimental study by Martijn, Tenbült, Merckelbach, Dreezens, and de

Vries (2002), participants were told that controlling their emotions would either reduce or enhance their subsequent self-control performance. The results showed that their performance on a subsequent task conformed to their expectations. When they expected to perform worse, they showed the typical ego depletion effect; when they expected to perform better, they, indeed, increased their performance.

Following that research, Job, Dweck and Walton (2010) developed a broad scale to specifically measure theories of willpower as limited or nonlimited, and to show that these willpower theories reliably moderate ego depletion. Their first studies on lay theories of willpower challenged the assumption that ego depletion – the poor self-control performance observed after a previous exertion of self-control – was inevitable. Job et al. (2010) suggested that ego-depletion is instead largely driven by people's expectancies and lay theories. Sure enough, while limited willpower theorists exhibited the normal ego depletion effect, with poorer self-control performance on a reaction-time inhibition task (a Stroop task) after previous self-control exertion (a difficult e-crossing task), nonlimited theorists did not exhibit the ego depletion effect – if anything, self-control performance on the reaction-time task improved after experiencing the initial cognitive work (Job et al., 2010). Participants who did not believe that strenuous mental activity caused fatigue did not experience fatigue after strenuous mental activity, suggesting that, at least in part, the ego depletion effect was driven by people's beliefs and expectations (see also replications by Chow, Hui, & Lau, 2015; Salmon, Adriaanse, De Vet, Fennis, & De Ridder, 2014).

Crucially, this was also the case when researchers manipulated lay theories of willpower by having participants fill out biased questionnaires that asked easy-to-agree-with questions about only whether mental exertion was sometimes fatiguing, or whether mental work was sometimes invigorating (Studies 2 and 3, Job, Dweck, & Walton, 2010). Because experimentally manipulating willpower theories also changes people's experience of ego depletion (see also Clarkson, Otto, & Hirt, 2016), we know that willpower theories have a causal impact on actual experiences of mental fatigue and decrements in self-control.

3 | MEASURING WILLPOWER THEORIES

Most research on willpower theories has focused on the degree to which people believe that strenuous mental activity is tiring (limited resource theory), versus that mental activity is energizing (nonlimited resource theory). When these willpower theories are measured, rather than manipulated, they are based on a self-reported scale consisting of six items: three items that ask about whether strenuous mental activity is fatiguing (e.g., "After a strenuous mental activity, your energy is depleted and you must rest to get it refueled again.") and three reverse-scored items about whether strenuous mental activity fuels itself (e.g., "After a strenuous mental activity, you feel energized for further challenging activities"; Job et al., 2010). These beliefs are assumed to be implicit, not because they are measured implicitly, but because people do not regularly think about their theories or about how their theories are informing their decisions and behaviour (Bernecker, Herrmann, Brandstätter, & Job, 2015). While this article frequently refers to limited and nonlimited theorists as if the scale is dichotomous, these theories are measured as a continuous variable – someone could have strong or weak beliefs in a limited or nonlimited willpower resource (experimental manipulations of lay theories usually do use two conditions, presenting a limited versus nonlimited theory). On average, American student samples tend to hold slightly more limited beliefs than nonlimited beliefs (e.g. means above the scale midpoint, although some preliminary evidence suggests that people's beliefs might shift to become more nonlimited as they age (Bernecker & Job, 2018; Job, Sieber, Rothermund, & Nikitin, in prep).

There are further individual differences in what types of behaviours people construe to be mentally fatiguing or energizing. Bernecker and Job (2017) developed a set of four subscales, which look at what types of activities are seen as fatiguing. In addition to whether strenuous mental activity is fatiguing or energizing, people can consider resisting temptations, physical activity, and emotion control to be differentially fatiguing or not. While these subscales correlate with one other, nuances in peoples' beliefs also predict their particular responses to those particular types of activities. For example, beliefs about strenuous physical activity being fatiguing are more related to physical activity, while beliefs about resisting temptations are more related to healthy eating (Bernecker & Job, 2015a; Bernecker & Job, 2017). Other categories of activities – like empathizing (Cameron, Hutcherson, Ferguson, Scheffer, & Inzlicht, 2016) or being in positions of power (Egan & Hirt, 2014) – might also be seen as fatiguing for some people, but as neutral or energizing for others.

Lay theories of willpower vary among other dimensions, beyond whether willpower is limited or nonlimited. An orthogonal dimension of willpower beliefs is whether people believe that their willpower capacity is fixed or malleable. Someone could believe that their willpower is nonlimited because they have trained themselves to be that way or because it grew with time – in that case, they would believe willpower is malleable and nonlimited. Someone else might also believe their willpower is nonlimited but believe that it has always been nonlimited and will always be nonlimited – a fixed and nonlimited willpower view. Limited theorists can also believe the limits to their willpower are fixed or malleable. These two separate dimensions of willpower beliefs can even interact to better predict specific types of outcomes (e.g. Mukhopadhyay & Johar, 2005; Mukhopadhyay & Johar, 2010).

Willpower theories are also distinct from trait self-control, which reflects how successful people typically are in exerting self-control (as asses by items such as "I´m good at resisting temptations"; Tangney, Baumeister, & Boom, 2004). Since, as we will outline below, implicit theories about willpower predict how successful people are in exerting self-control in their everyday life, it is not surprising that implicit theories about willpower are positively correlated with trait self-control, between r = .17 and r = .40 (Bernecker et al., 2015; Job et al., 2010). However, they are conceptually separate constructs with trait self-control reflecting past self-control success and willpower theories reflecting peoples believes about the nature of self-control capacity. Someone could be typically good in exerting self-control on single occasions, while also believing that their self-control capacity can quickly become diminished. Someone else could have generally low self-control, yet believe that strenuous mental activity improves their ability to engage in more self-control. Furthermore, particularly when contrasting low-demand and high-demand situations, willpower theories are more predictive of outcomes than is trait self-control (e.g., Bernecker & Job, 2015a; Job, Walton, Bernecker, & Dweck, 2015). This pattern of results supports the conceptual distinction of willpower theories and trait self-control by suggesting that even though a person might have high trait self-control believing that willpower is limited undermines their self-control capacity specifically when self-control demands accumulate.

4| EVERYDAY OUTCOMES OF WILLPOWER THEORIES

Willpower theories often have the largest effect during times when people experience higher demands than normal – more stress, more previous work, more potential fatigue. During times of low demand, both limited and nonlimited willpower theorists perceive themselves to have sufficient energy available. However, during times of high demand – due to increased stress about exams (Job, Walton, et al., 2015), after having focused on a difficult task (Job et al., 2010), or even just later in the day (Francis,

Mata, Flückiger, Sieber, & Job, in prep) – limited willpower theorists' self-control capacity is diminished. Apparently, these limited theory students feel like they have less energy available, specifically when they would need it most (Job, Walton, et al., 2015). In these same demanding situations, nonlimited theorists can even be especially prepared or feel energized for additional work.

Because demanding and potentially tiring situations happen so frequently in everyday life, limited willpower beliefs can contribute to generally poorer outcomes in any domain that requires self-control. Self-control is necessary for many parts of life, including goal-setting and goal-pursuit, academics, work, and learning, health outcomes, maintaining interpersonal relationships. In all of these domains, willpower theories change people's expectations and their actual outcomes, with an ultimate effect on subjective well-being.

4.1 | Academics and Learning

Successful academic and career performance relies on the consistent use of self-control. The relationship between trait self-control and academic/career outcomes is stronger than the relationship between trait self-control and any other life domain (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). Unsurprisingly, academic and career outcomes are associated with lay theories of willpower – limited willpower theorists may not believe that they have self-control available, particularly during the stressful and demanding situations frequently found in our schools and workplaces.

Two longitudinal studies have found that students with limited willpower theories reported poorer self-regulation on academic tasks during high-demand times, such as during final exams (Study 4, Job et al., 2010; Job, Walton, et al., 2015). During these stressful times, students who perceived their resources to be limited ended up procrastinating more and managing their time more poorly. Limited-theorist students who had a heavy course load even ended up with a lower GPA, compared to nonlimited theory students with similar course loads (Job, Walton, et al., 2015). Furthermore, limited resource theorists have difficulty sustaining attention, which may impair studying; Miller et al., (2012) randomly assigned students to either a limited or nonlimited resource theory condition, after which they completed a 20-minute sustained learning task. Although all participants performance was similar at the beginning of the task, nonlimited theory participants continuously improved their performance and performed significantly better than limited theory participants in the second half of the task, when limited theorists could reasonably attribute fatigue.

Lay theories of willpower are likely to affect performance beyond the school years and into the adult workforce. Preliminary results find that adult limited willpower theorists report having completed less formal education than adults with nonlimited willpower theories and they are less likely to hold a superordinate position in a company, which cannot be explained by differences in trait self-control. Limited willpower theories are also associated with a lower likelihood of working full-time (and higher likelihood of working part-time), even after controlling for age, education level, and trait self-control. Moreover, two longitudinal studies find that limited theorists may be especially vulnerable to burn-out from high-stress and demanding jobs (Job, Heller, & Savani, in prep). Future research should examine how lay theories affect career progression and performance after university, and specifically examine the causal directions in the relationships between employment and willpower theories.

4.2 | Goal Setting and Goal Pursuit

Willpower theories predict how effectively people pursue their goals, particularly during times of high demand. In one study, students with limited willpower theories reported less self-regulation in regard to a personal goal during an exam period, while students with nonlimited willpower theories maintained their goal pursuit (Study 4; Job et al., 2010). This interaction between willpower theories and demand levels was replicated in a daily diary study, which found that students with limited willpower theories also had less effective goal-pursuit on the days after a demanding day (Bernecker & Job, 2015b). Nonlimited willpower theorists, meanwhile, reported more effective goal-striving on the days following a demanding day. Mukhopadhyay and Johar (Study 3; 2005) also found that limited resource manipulations can decrease people's self-reported completion of goals, but only in participants with low self-efficacy. Across these studies, beliefs about one's capacity to continue to exert self-control has an impact not only on lab-based performance measures, but also on people's own subjective reports of their successful pursuit of their goals.

4.3 | Health

Limited willpower theories can be harmful to one's health. By interfering in goal-pursuit, a limited willpower theorist may be less likely to continue to pursue that goal when life becomes demanding. Limited willpower theories are also associated with poorer self-regulation during times of high demand, which can result in poorer diet, less physical activity, and less adherence to medical therapy (Bernecker & Job, 2015a).

Multiple studies have found that limited willpower theorists eat more unhealthy food than nonlimited theorists, particularly during times of high demand or possible fatigue. In a longitudinal study, Job, Walton, et al. (2015) found that students who believed that willpower was limited consumed more unhealthy food when they experienced high demands. An experience sampling study of community members found that limited willpower theorists snacked progressively more than their nonlimited willpower theorist counterparts, particularly later in the day (Francis et al., in prep). Diabetic patients who held limited willpower theories were also less likely to follow a healthy eating plan (Bernecker & Job, 2015a).

Limited theorists' extra snacking and poorer eating may be a direct result of poorer self-control engagement during demanding times, but it is also possible that limited theorists believe that eating can help re-energize their resources and counteract their mental fatigue. Supporting this idea, a lab-based depletion study found that consuming a sugary drink counteracted the depletion effect generally experienced by limited willpower theorists; nonlimited willpower theorists, who do not experience depletion as readily, had consistent good performance regardless of whether or not they consumed a sugary drink (Job, Walton, Bernecker, & Dweck, 2013). Even if snacking or poor eating does rejuvenate limited theorists energy, it may come at a cost: limited willpower theorists have higher body mass indexes (BMI) compared to nonlimited theorists (Bernecker & Job, 2015a; Francis et al., in prep), leaving them at higher risk for a variety of weight-related conditions (Housman & Dorman, 2005).

Not only do diets and snacking differ by willpower theories, but so are patterns of physical activity and exercise. The aforementioned experience sampling study found that nonlimited willpower theorists increased their physical activity over the course of the day, but limited willpower theorists did not (Francis et al., in prep). Diabetic patients with limited willpower theories also reported less frequently engaging in at least 30 minutes of physical activity (Bernecker & Job, 2015a). One contributing reason to limited theorists' lack of physical activity may be their increased motivation to

rest (Job, Bernecker, Miketta, & Friese, 2015). In a series of studies, participants with a limited-resource perspective (either experimentally induced or measured) were more attracted to rest-related objects and stayed seated in a chair for longer compared to participants with a nonlimited resource perspective (Job, Bernecker, et al., 2015). A motivation to seek rest and conserve energy may be one reason why limited willpower theorists engage in less physical activity and exercise.

Finally, self-care for type 2 diabetes, including controlling blood sugar and remembering to take insulin injections, is also related to willpower theories. Holding limited willpower theories was associated with poorer diabetes self-care (Bernecker & Job, 2015a), specifically for people with recently-diagnosed diabetes. People who had been living with diabetes for longer periods of time had equal levels of self-care regardless of their willpower theories, presumably because taking care of their diabetes had become habitual and no longer required self-control.

Abstaining from other unhealthy or dangerous behaviours (like smoking cessation), and engaging in proactive health behaviours (like attending exercise classes) also require self-control, particularly when making changes that are not yet habitual (Duckworth, Gendler, & Gross, 2016). Theories of willpower might affect the success people experience when making these lifestyle changes, particularly when these changes happen simultaneously with other self-control demands or stressors.

4.4 | Interpersonal Relationships

Implicit theories do not only affect our own behaviours; beliefs about willpower relate to how we act in social interactions, including when making social judgements, providing social support, or making parenting choices. Generally, beliefs about our own willpower are used to guide what we expect from other people's willpower. For example, in one study, participants compared one student, who had just finished writing a two-hour exam, to a second student who had written an exam the day prior and then predicted how well these students would do on a subsequent mental puzzle. Participants responded in different ways based on their willpower theories: for example, a limited-theorist participant stated, "I bet John did bad [because] he just took a big test and his brain is probably fried. The second guy went into the task more fresh", while a nonlimited theorists participant wrote, "I felt the first student was in 'exam mode' from his recent experience that same day and that he'd do better as a result". Generally, limited willpower theorists predicted that the prior-effort student would perform relatively more poorly, while the nonlimited willpower theorists expected the prior-effort student to perform relatively better .

Potentially, limited theorists could have an advantage in social situations, since they are more likely to acknowledge that a target person is potentially fatigued and in need of support. In one study (and its replication) of hypothetical scenarios, limited theorists did predict that they would be more understanding of their romantic partner's annoying behaviours if their partner had just had a demanding day, and less understanding if their partner had had a relaxing day (Francis & Inzlicht, 2017). Nonlimited theorists responded more consistently to their partner's annoying behaviours, regardless of the level of demand their partner had hypothetically previously experienced. However, other studies suggest that these perceptual benefits do not readily translate into more actual supportive behaviours – instead, limited willpower theorists are actually less likely to help, compensate for, or provide support to a fatigued or low self-control partner (Francis & Inzlicht, 2017). From a limited resource perspective, providing social support is itself depleting (Gosnel & Gable, 2017) and should thus be avoided, when possible, to conserve energy. Doing additional work to compensate for another person's poor performance would similarly result in fatigue. Although limited theorists may be more likely to perceive

that someone is tired, they are less likely to provide support since they are concerned about conserving their own resources.

Willpower theories also affect parenting decisions. Mukhopadhyay and Yeung (2010) found that limited willpower theorists who also believed that self-control was malleable were most likely to try to grow their children's self-control capacity through their parenting choices. These limited-malleable willpower theorists (measured or manipulated) were more likely to choose educational gifts for their children, presumably intending to strengthen the child's self-control. They were also more likely to restrict fast-food consumption and unhealthy snacking. Parents who believed that willpower was nonlimited, or that willpower capacities are limited but fixed (e.g. cannot be improved with practice), chose relatively fewer educational gifts and were more allowing of unhealthy food choices. While it is unknown whether these parenting behaviours actually do improve a child's self-control, parent's implicit theories of willpower may be passed on to their children, with their theories reinforced by their parenting decisions.

Because self-control is involved in maintaining positive relationships, willpower theories could also have other social ramifications. People with generally higher self-control are trusted more (Righetti & Finkenauer, 2011), show more accommodation to their partners (Finkel & Campbell, 2001), and have better quality relationships (de Ridder et al., 2012). Like other domains, willpower theories may predict these interpersonal outcomes above and beyond trait-levels of self-control. For example, limited willpower theorists might have positive social interactions during times of low-demand, but be more likely to exhibit negative social behaviors when times get tough. Furthermore, dyadic goal-pursuit – including the role of social support in goal-pursuit (Jakubiak & Feeney, 2016) – is also likely affected by willpower theories, as one person's goal striving impacts their partner's. If a limited theorist has poor self-regulation during times of stress, their partner may experience negative effects as they try to accommodate the limited theorist. Future research should explore the interpersonal consequences of willpower theories.

4.5| Well-being

Appropriate goal-pursuit and healthy lifestyles can both have secondary effects on subjective well-being (Okun, Stock, Haring, & Witter, 1984; Penedo & Dahn, 2005; Riediger & Freund, 2004). Given that limited willpower theories seem to limit the obtainment of these positive behaviours, it is unsurprising that limited willpower theories are also related to poorer subjective well-being and more negative affective states, particularly during times of higher-demands (Bernecker et al., 2015). Students with more limited willpower theories reported lower subjective well-being six months later (Study 1; Bernecker et al., 2015), and willpower theories particularly predicted subjective well-being during an exam period (Study 2). Lower subjective well-being was mediated by the limited theorists having less effective goal-striving (Study 3; Bernecker et al., 2015). On a daily level, limited willpower theorists report more negative mood and less self-efficacy compared to nonlimited theorists, particularly later in the day, when they also report feeling more fatigued (Francis et al., in prep).

5 | MECHANISMS

These studies demonstrate how mental fatigue and ego depletion are not inevitable states. Instead, people's expectations and beliefs determine whether self-control weakens or strengthens with use.

Willpower theories might change the experience or consequences of self-control use via different mechanisms. First, willpower theories might affect how people experience the initial self-control tasks. Tasks that are experienced as depleting tend to lead to depletion, while reframing the same tasks as something fun or intrinsically-driven can reverse or cancel the ego depletion effect (Laran & Janiszewski, 2011; Werle, Wansink, & Payne, 2014) – so do nonlimited theorists consider self-control tasks to be less difficult or more fun? So far, this has not been the case – both limited and nonlimited theorists report self-control tasks to be equally difficult and exhausting (Job, Bernecker, et al., 2015; Job et al., 2010, Study 3). Whether willpower theories affect the perception of other task characteristics, such as whether it is rewarding, or challenging or threating (Blascovich & Mendes, 2013), is not yet known.

Instead, willpower theories might affect whether people react to or ignore signals of mental fatigue. Perhaps all people experience fatigue as a result of previous mental exertion, but only the limited willpower theorists notice and react preemptively, by reducing their self-control exertion in order to prevent more mental fatigue. A series of studies by Vohs, Baumeister, & Schmeichel (2012) found that nonlimited willpower theories only moderated "mild" ego depletion, but that after a series of four self-control tasks, all participants had reduced performance on the final task regardless of their willpower beliefs. This could suggest that everyone experiences fatigue, but that nonlimited theorists are able to overcome the fatigue most of the time. The studies examining everyday life, however, find that nonlimited theorists perform better than limited theorists particularly when demands and stress are high. It seems unlikely that nonlimited theorists constantly overcome their fatigue in everyday life with no apparent negative consequences. The results by Vohs et al. (2012) may be more likely explained by a lacked of motivation to do yet another unrewarding and seemingly purposeless task in the lab-based experiment in both, nonlimited theorists and limited theorists alike.

The research on willpower theories suggests that the lay theories themselves might cause or prevent ego depletion from occurring at all. Mechanisms that are hypothesized to underlie the ego depletion phenomenon – such as glucose-availability (Baumeister & Vohs, 2016; Gailliot et al., 2007) or finding balance between motivations to work and rest (Francis & Inzlicht, 2016; Inzlicht et al., 2014) – are both moderated by willpower theories. The predictions generated by these models (respectively, that consuming glucose should prevent depletion, and that depletion should result in increased motivation to rest) were observed within groups of limited willpower theorists, but not with nonlimited theorists (Job et al., 2013; Job, Bernecker, et al., 2015). Perhaps the expectations derived from willpower theories affect how mental work is processed. Specifically, willpower theories might change the expected value of a self-control task, including its feasibility and desirability. Supporting this perspective, recent research suggests that changes in self-efficacy mediate the effects of willpower theories on self-control (Chow, Hui, & Lau, 2015). After participants in a dual task experiment exerted self-control, those with a limited resource theory reported reduced self-efficacy regarding self-control exertion. This result implies that they expected to be less successful on consecutive self-control tasks. Such differences in expectation and valuation processes might explain why nonlimited theorists do not experience the shift in motivational priorities that limited theorists do.

6 | HOW WILLPOWER THEORIES DEVELOP AND CHANGE

Given that nonlimited theories of willpower are associated with so many positive outcomes, we aim to understand where these beliefs originate and, ultimately, how these beliefs could be harnessed to improve people's academics, health, and well-being. Interventions encouraging growth mindsets – the

lay theory that intelligence is malleable – have been successfully used to improve academic outcomes (Paunesku et al., 2015; Yeager et al., 2016). Could lay theories of willpower be similarly developed into helpful interventions, not only to improve academic outcomes (Job, Flückiger, Bernecker, Lieb, & Mata, in prep), but to encourage better health, productivity, and goal-pursuit? Research on the factors and experiences that contribute to limited or nonlimited willpower belief is only beginning, but preliminary evidence suggests that cultural factors and individual experiences of self-efficacy both play important roles.

6.1 | Sources of Willpower Theories

What factors lead to people believing that willpower is either limited or nonlimited? On a societal level, different cultures tend to hold different theories of how self-control and willpower work. While Americans generally believe that using willpower results in fatigue and thus experience ego depletion, Indians generally believe that using willpower is energizing and experience the *reverse* of ego depletion, where performance instead improves after prior self-control use (Savani & Job, 2017). Hockey (2013) further points out that beliefs about the nature of willpower and fatigue have changed across time, with the energy-based resource metaphor of willpower only becoming common around the Industrial Revolution. Varying beliefs between cultures and time suggest that willpower theories are at least partially culturally transmitted.

Most research on willpower theories, however, has been done by examining individual differences in willpower theories within Western cultures. What factors result in particular people developing more limited or nonlimited views of willpower within one culture? Recent research suggests that one factor influencing people's theories about willpower is the amount of autonomy they experience when striving for personal goals (Sieber, Flückiger, Mata, Bernecker, & Job, in prep). Two longitudinal studies showed that people who pursued their personal goals autonomously (because it was fun or important) were more likely to develop a nonlimited willpower theory over the next couple of months than people who pursued goals due to controlled, external reasons (i.e. because they 'had' to). These changes were mediated by differences in the amount of vitality participants experienced in their everyday life. Hence, willpower theories, at least to some extent, mirror the amount of energy people perceive themselves as having in their everyday life. People feel energized when they do things that are fun or important and they feel depleted when they do tasks they do not really care about. Such experiences of vitality, may be, eventually, incorporated into people's theories of willpower as either limited or rather nonlimited.

6.2 | Willpower Theory Interventions

As shown by a number of the studies discussed above, willpower theories can be temporarily manipulated within laboratory experiments (Job, Bernecker, et al., 2015; Job et al., 2010). Priming one theory – either by having participants read a biased article or fill out a biased questionnaire – changes participants beliefs and behaviours immediately afterwards. Mukhopadhyay and Johar (2005) even found that reading biased information about the nature of willpower, followed by selecting goals, changed how successfully participants completed their goals, as indicated three to four months later, while Job, Flückiger, and colleagues (in prep) found that a nonlimited theory intervention could improve first-year university students' academic self-regulation and grades. Reliably changing willpower theories,

with effects across longer time scales, may require more intensive approaches than short primes. Taking inspiration from growth mindset interventions, successful interventions to encourage nonlimited willpower theories may include repetition, longer workshops, and application of the nonlimited theory to one's own life (Yeager et al., 2016). Alternatively, instead of attempting to use direct messaging, beliefs about the nature of willpower may be best influenced indirectly, by encouraging the experiences and factors (e.g., autonomy) that themselves lead to the development of nonlimited willpower beliefs.

7 | THEORETICAL IMPLICATIONS

Willpower theories – even when experimentally manipulated – can change people's experience of ego depletion, including their behaviour on self-control tasks and rest-goal activation (Job, Bernecker, et al., 2015; Job et al., 2010). These studies demonstrate the importance of top-down, motivational forces on people's experience of self-control and self-control failure. The ability to manipulate people's experience of self-control depletion, without clearly affecting physiological resources, provides support to various motivational theories of ego depletion (Berkman, Hutcherson, Livingston, Kahn, & Inzlicht, 2017; Inzlicht & Schmeichel, 2012; Kurzban, Duckworth, Kable, & Myers, 2013). Cross-cultural research on willpower theories, which find that the *reverse* of ego depletion occurs in Indian contexts (Savani & Job, 2017), further suggests that ego depletion is not a universal, physiologically-based phenomenon. Instead, many depletion effects seem to be motivationally driven, dependent on top-down expectations and subjective factors, and – encouragingly – are not inevitable.

Of course there might be boundary conditions limiting the self-control enhancing effects of a nonlimited willpower theory. When people find themselves in extreme physical or psychological circumstances (e.g., torture, famine, or illness) other processes may arise. Also, the positive effects of a nonlimited theory do not imply that people may continue to exert themselves endlessly without needing food or sleep. Accordingly, willpower theory research should not be misused to press people to work themselves into the ground if they feel the need for rest and recovery. What this research shows, is that a nonlimited willpower theory helps people to stay engaged a bit longer as compared to a limited theory, which, in the long run, is beneficial with regard to various life outcomes. In contrast, the limited willpower theory undermines people´s self-control capacity when they face high demands. It leads them to conserve resources and reduce effort too early, way before they reach any true limits.

8 | CONCLUSIONS

The experience of mental exertion as energizing or fatiguing depends strongly on one's own theory of self-control as limited or nonlimited. When people believe or are led to believe that self-control is nonlimited, they can continue to self-regulate effectively, even in demanding situations. Nonlimited theories generally lead to better outcomes in academics, health, interpersonal relationships, and subjective well-being. The common belief in Western societies that willpower relies on a limited resource, on the other hand, is generally associated with poorer outcomes. Limited willpower theories may be one driving factor behind the ego depletion phenomenon – to this extent, future studies should examine the origin and development of these willpower theories and determine how interventions targeting these beliefs may be used to improve people's self-control and well-being.

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