Technische Universität München
TUM School of Management

Positive Reappraisal as a Volitional Strategy: Can Rethinking Rationales Help Overcoming Instances of Insufficient Motivation?

Raphael Tobias Müller-Hotop

Vollständiger Abdruck der von der TUM School of Management der Technischen Universität München zur Erlangung eines

Doktors der Philosophie (Dr. phil.)

genehmigten Dissertation.

Vorsitz: Prof. Dr. Isabell M. Welpe

Prüfende der Dissertation:

1. Prof. Dr. Hugo M. Kehr
2. Prof. Dr. Marie Hennecke

Die Dissertation wurde am 28.12.2023 bei der Technischen Universität München eingereicht und durch die TUM School of Management am 15.05.2024 angenommen.

“[T]hings indifferent or even repulsive in themselves often become of interest because of assuming relationships and connections of which we were previously unaware. […] Whether [something] appeals or fails to appeal is a question of relationship.”
(Dewey, 1913, p. 22).

Acknowledgements

“Which is more important,” asked Big Panda, “the journey or the destination?”
“The company.” said Tiny Dragon.
(James Norbury)

The path to submitting this doctoral thesis was an educational, exciting and often demanding one. Many people guided and supported me along the way. I would like to take this moment to thank all those who have accompanied me on this path.

My gratitude goes to *Hugo Kehr*, who inspired me with his work and made it possible for me to write about a topic that really interests me. I am especially grateful for having been able to participate in the Munich Symposium on Motivation on two occasions. In beautiful surroundings, I had the opportunity to meet other researchers whom I admire due to their publications. I have always followed *Marie Hennecke's* research with enthusiasm and felt truly inspired by it. Thus, I am very grateful that she supervised my work as second examiner.

I cordially thank my colleagues: *Andrea Paulus*, *Anna Oostendorp*, *Julia Trapp*, *Johann Gutzmer*, *Matthias Strasser*, *Marius Jais* and *Cafer Baker*. The discussions we had together, the critical questions and the numerous ways they helped me have significantly shaped my scientific thinking. *Johann*, our collaboration and our shared adventures and achievements in teaching have had a lasting impact on my personal development. I am also full of gratitude for *Jörg Seeliger*, who has always been a role model for me in terms of willpower, has shown incredible sensitivity and has been full of kindness even in the most stressful moments. Furthermore, I would like to thank sincerely *Claudia Luck* and *Ernesto Vanoni*; both have been the soul of the academic chair and an immeasurable support in countless situations. Thanks to all of you, my time at the chair became a highly defining team experience.

I am so thankful for my friends for never giving up on encouraging me to make the journey and submit this work. My special thanks for her support go to *Natalie Sharp*.

My family played a central role in my decision to follow a scientific path in life. My parents showed me how important it is to ask questions, think for myself and persevere in the pursuit of my goals. My sister *Mira Müller-Hotop* has given me an unshakable confidence in my abilities and has always supported me in any way she could.

I would never have completed this work if I hadn't had the support of my wife, *Katharina Müller-Hotop*: *Kathi*, I thank you immensely for your patience and your full support. This work has required a substantial amount of time that I would have preferred to spend with you, *David* and *Theo*.

I have learned a lot during this journey about what is really important to me: more than gaining knowledge about things that interest me, it is the experiences with the people I love.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

a) General abbreviations

cf.	confer
e.g.	exempli gratia
et al.	et alii
etc.	et cetera
i.e.	id est
vs.	versus

b) Experimental manipulations

AIQ	Answering irrelevant questions
RAS	Receiving autonomous rationales communicated in an autonomy-supportive way
RCR	Receiving controlling rationales
SGAR	Self-generating autonomous rationales

1 Abstract

Can reappraising an insufficiently motivated behavior boost motivation toward it? While a large amount of research already attests that positive reappraisal is highly effective as an emotion-regulation strategy, its effectiveness as a volitional strategy helping to overcome insufficient motivation has not yet been investigated systematically. In the current work, I 1) derived a conceptualization of positive reappraisal as a volitional strategy and 2) empirically examined its effectiveness. To that end, I combined the process model of self-regulation (Duckworth, Gendler, & Gross, 2014) with the multidimensional conceptualization of motivation from self-determination theory (e.g., Ryan & Deci, 2000; 2020). I operationalized the strategy's effectiveness by examining the effectiveness of self-generated autonomous rationales in instances of controlled motivation. Moreover, I proposed that the internalization process as a mechanism can explain its effect. I conducted four lab studies as well as a field study using experience sampling method. In each experiment, I prompted the participants either to self-generate autonomous rationales for engaging in a controlled motivated activity or to describe the activity, and assessed several motivation-related variables. In some (but not all) studies, I found, in line with my hypotheses, that self-generating autonomous rationales in instances of controlled motivation can facilitate interest/enjoyment, task value and autonomous motivation toward the focal activity as well as subjective vitality (indirectly). Furthermore, I found support for the notion that internalization may explain the strategy's effectiveness. Thus, my work provides first insights for when and how positive reappraisal can increase motivation toward an otherwise insufficiently motivated behavior. I discuss my findings that lend support for the strategy's overall efficacy in tandem with my null-findings as well as methodological issues that could be addressed in future research. To synthesize current and to inspire future research, I finally put forth an integrative framework for positive reappraisal which highlights the strategy's process and effectiveness in a nuanced manner. This framework suggests that positive reappraisal as a volitional strategy encompasses several components and that various situation- (e.g., controllability) and person-related factors (e.g., expectancy appraisals or mindfulness) determine its effectiveness. Drawing on my own findings as well as on suggestions derived from the integrative framework, I conclude that positive reappraisal as a volitional strategy should be effective particularly in instances, where people cannot or do not want to change the situation and where the focal activity seems feasible.

2 Introduction

Sometimes, simply rethinking rationales can boost motivation toward an otherwise insufficiently motivated behavior. Take, for example, the management student who initially sits down to prepare for an exam with a great deal of inner resistance, but then enthusiastically attends to the learning material after visualizing that she can use what she will learn as soon as she has founded her start-up. Or take the employee who finds it difficult to commence a boring task he has to complete for a rather uninteresting project, but then carries it out with motivation after visualizing that his colleagues, whom he appreciates very much, also benefit from his work. With the current work, I propose that such changes in motivational states can be attributed to a process termed positive reappraisal (Folkman & Moskowitz, 2000; Garland, Gaylord, & Fredrickson, 2011). Generally speaking, this process relates to "cognitive strategies for reframing a situation to see it in a positive light" (Folkman & Moskowitz, 2000, p. 650). The benefits of positive reappraisal are well established in research on regulating negative emotions and stress (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Garland et al., 2011; Hanley, Palejwala, Hanley, Canto, & Garland, 2015; Jamieson, Crum, Goyer, Marotta, & Akinola, 2018; Nowlan, Wuthrich, & Rapee, 2015; Pavani, Le Vigouroux, Kop, Congard, & Dauvier, 2015; Ranney, Bruehlman-Senecal, & Ayduk, 2016; Webb, Miles, & Sheeran, 2012). However, the strategy has been largely neglected by research regarding the (up-)regulation of motivational states. We still understand relatively little about when and how positive reappraisal can be effectively deployed in order to enhance motivation.

I believe that examining when positive reappraisal is effective in overcoming insufficient motivation and understanding how it works, will be useful in practice, as insufficient motivation appears to be a widespread phenomenon (EY, 2019; Gallup, 2023; Hennecke, Czikmantori, & Brandstätter, 2019; van Hooft & van Hooff, 2018). It is also particularly present in the work context (e.g., Gallup, 2023) as well as the educational context (e.g., Klein, Noe, & Wang, 2006; Murayama, Pekrun, Lichtenfeld, & vom Hofe, 2013). In Germany, for example, only 13% of employees report that they are engaged at work, whereas more than two thirds (69%) report that they are not engaged (Gallup, 2023, p. 3). A similar picture can be portrayed with regard to the educational sector: Whereas motivation is central to learning and achievement (e.g., Heublein et al., 2017; Klein, Noe, & Wang, 2006; Murayama et al., 2013), convergent evidence shows that in schools, it declines across grades (Gnambs & Hanfstingl, 2016; Lepper, Henderlong Corpus, & Iyengar, 2005; Skinner, Furrer, Marchand, & Kindermann, 2008). Moreover, approximately 30% of all Bachelor students in Germany ultimately drop out of their studies, with insufficient motivation being one of the principal causes (Heublein et al., 2017). These findings show that employees as well as students often have to engage in insufficiently motivated behavior (e.g., completing on an uninteresting work assignment or learning boring

course material) in order to avoid negative consequences (e.g., negative feedback or poor results) or to achieve long-term goals (e.g., a promotion or graduation).

With the current work, I aim to acknowledge the potential of positive reappraisal as a volitional strategy. In this regard, I pursue three goals: 1) Clarifying the concept of positive reappraisal as a volitional strategy; 2) providing a framework that helps to predict the strategy's effect and suits to outline underlying processes; 3) empirically examining the effectiveness of positive reappraisal as a volitional strategy under controlled conditions.

In my theoretical frame of reference I will describe when and how I expect positive reappraisal to be helpful in overcoming instances of insufficient motivation. I will begin with outlining the underlying understanding of motivation as well as of insufficient motivation. Thereafter, I argue that overcoming insufficient motivation requires volitional regulation (e.g., Kehr, 2004) and conceptualize positive reappraisal as a volitional cognitive change strategy (Duckworth, Gendler, & Gross, 2014, 2016).

In order to operationalize the effectiveness of positive reappraisal as a volitional strategy, I draw on research grounded in self-determination theory (Deci & Ryan, 1985; R. M. Ryan & Deci, 2000; Steingut, Patall, & Trimble, 2017) and develop a self-determination-based framework of positive reappraisal's effectiveness. More specifically, I ground my hypotheses in convergent empirical findings suggesting that increases in motivation quality compared to quantity is generally more effective regarding achievement and well-being-related outcomes (e.g., Howard, Gagné, Morin, & Van den Broeck, 2016; Steingut et al., 2017). In this regard, I propose that implementing positive reappraisal as a strategy relates to self-generating autonomous rationales in instances of controlled motivation; I propose furthermore that self-generating autonomous rationales facilitates internalization of the focal activity and, thereby, leads to positive, adaptive outcomes.

The current work contributes empirically with two experimental studies and two replication attempts as well as with one field study. Thereby, it expands the knowledge on the effectiveness of positive reappraisal as a volitional cognitive change strategy in instances of insufficient motivation. Furthermore, it contributes empirically by analyzing the effectiveness of self-generated rationales with respect to self-determination theory and by considering motivational quality with respect to research on self-deployed motivation-enhancing strategies (e.g. Canning & Harackiewicz, 2015).

Aside from its empirical contribution, the current work adds to theoretical conversations by integrating positive reappraisal in the psychology of motivation and volition and, moreover, by integrating two previously rather unrelated perspectives in motivation research: Thus far, research drawing on self-determination theory has solely focused on the effects of rationale provision and neglected the effects of self-generated rationales; the consideration of motivational quality as described in self-determination theory (see Vansteenkiste et al., 2018)

has, however, been largely neglected in research analyzing the effects of self-generated rationales (e.g., Hulleman, Godes, Hendricks, & Harackiewicz, 2010).

Ultimately, the current work points to practical implications of positive reappraisal as a volitional strategy that helps to overcome insufficient motivation by changing how one relates to the focal behavior and not by changing the behavior itself.

3 Theoretical Frame of Reference

In the current work, I examine the effectiveness of positive reappraisal as a volitional strategy that helps overcoming insufficient motivation (Kehr & v. Rosenstiel, 2006; Kuhl & Fuhrmann, 1998). In order to set the stage for the positive reappraisal strategy, I will begin with clarifying the concept of insufficient motivation by contrasting it to the concept of motivation. Regarding this, I will first touch upon the classic approach to motivation before I describe different types of motivation and define insufficient motivation. Thereafter, I will outline that it requires volitional regulation in order to overcome insufficient motivation, with positive reappraisal being a promising, but – up until now – understudied volitional strategy.

3.1 Motivation: The Result of a Person-Situation Interaction

Motivation can be defined as "a set of energetic forces that originate both within as well as beyond an individual's being, to initiate […] behavior, and to determine its form, direction, intensity, and duration" (Pinder, 2008, p. 11). It results from the interaction of a person's motives with value properties perceived in a situation, typically termed incentives (e.g., Beckmann & Heckhausen, 2018; Latham & Pinder, 2005). Thus, in order to understand motivation (and insufficient motivation respectively) it is necessary to consider situation as well as person factors.

3.1.1 Situation Factors: Incentives

"Every positive or negative outcome that a situation can promise or signal to an individual is called an 'incentive' and has 'demand characteristics' for an appropriate action" (Heckhausen & Heckhausen, 2018, p. 6). It is therefore the perception of *incentives* that elicits motivational states (e.g., Beckmann & Heckhausen, 2018). However, incentives can either have a positive or a negative valence. An example of the former would be when a person anticipates a rewarding experience and an example of the latter would be when the person anticipates a punishment, a loss or the experience of shame (see Beckmann & Heckhausen, 2018). In other words, positive incentives are information that promises a reward; negative incentives are information that presents the prospect of a threat. Incentives can be further distinguished with regard to where they are perceived: in the activity itself, its outcome or its anticipated consequences (Heckhausen & Heckhausen, 2018; Rheinberg & Engeser, 2018). Following this differentiation, an employee may be motivated to work with a new software, because she enjoys doing it (i.e., the activity itself), for the activity's outcomes such as feeling pride for having learned something new (i.e., outcome), or because she anticipates that being an expert for this software will be beneficial for her career (i.e., consequence). Outcome- and

consequence-related incentives can be also subsumed under the term purpose-related incentives (Rheinberg & Engeser, 2018).

Crucial for the current work, however, is the notion that "incentives residing in activities, action outcomes, and their consequences are not set in stone; they take shape in the eye of the beholder" (Heckhausen & Heckhausen, 2018, p. 8). Thus, it is ultimately the appraisal of situational properties as positive or negative incentives that influences a person's motivational tendencies (e.g., Beckmann & Heckhausen, 2018; Duckworth et al., 2014; Heckhausen & Heckhausen, 2018). Consequently, whether situational properties are perceived, for example, as positive incentives can vary between individuals as much as it can vary within a person over time (cf. Lewin, 1926, p. 296). The following examples illustrate these two categories: Many people dislike writing their tax report, but there are tax consultants who passionately pursue their profession (between individuals); a student might start to enjoy a subject she had disliked earlier in the semester (within an individual).

In sum, the perception of incentives motivates behavior; they are the reasons why a person engages in an activity (or tries to avoid it) or why the person pursues a specific goal. Importantly, they are part of the realm of subjective experience. But why do some situational properties (and not others) work as incentives for some people (and not others)? Regarding this issue, Heckhausen and Heckhausen (2018) state that a "situation is always something that is perceived, i.e., the product of an individual's thought and is thus itself influenced by person factors" (p. 8). Hence, to fully understand what works as an incentive that elicits motivation, it is necessary to consider person factors in addition to situation factors.

3.1.2 Person Factors: Motives

Theoretically, any situational stimulus can serve as an incentive; in practice, however, in order for a person to perceive a situational property as an incentive, the stimulus would have to correspond to their personal *motives* (e.g., Deci & Ryan, 2000; Heckhausen & Heckhausen, 2018; McClelland, 1985; Sheldon & Schüler, 2011). "Motives refer to people's wishes and desires – states of affairs that they would like to bring about (consciously or unconsciously) or, in the case of avoidance motives, states of affairs they would like to prevent" (Winter, John, Stewart, Klohnen, & Duncan, 1998, p. 231).[1]

Regarding this issue, different motivation theories, such as motive-disposition theory (McClelland, 1985) or self-determination theory (Deci & Ryan, 1985; Deci & Ryan, 2000; Ryan

[1] Similarly, Dewey (1913) proposed the following definition: "Motive is the name for the end or aim in respect to its hold on action, its power to move. [...] [T]his moving power expresses the extent to which the end foreseen is bound upon up with an activity with which the self is identified."(Dewey, 1913, p. 60).

& Deci, 2000), propose different motive concepts and take different motivational processes into account:[2]

Motive-disposition theory, for example, defines motives as preferences for specific kinds or classes of incentives (e.g., achievement-, power-, and affiliation-related incentives) and distinguishes two motivation systems: affect-based implicit motives and cognition-based, self-attributed explicit motives (McClelland, 1985; McClelland, Koestner, & Weinberger, 1989). The theory suggests that an implicit motive gets aroused, when a person (implicitly) perceives an incentive that corresponds to the need for achievement, power or affiliation. Explicit motives, however, get activated when a person perceives an incentive that corresponds to self-attributed needs, values or goals (Kehr, 2004; McClelland, 1985; McClelland et al., 1989). Whereas, on the proximal level, aroused implicit motives correspond to affective preferences, activated explicit motives correspond to cognitive preferences (Kehr, 2004; Kehr, Strasser, & Paulus, 2018). Studies drawing on implicit and explicit motive systems typically emphasize individual differences in motive strength as well as the consequences of implicit and explicit motive congruence/discrepancy (cf. Brunstein, 2018; Kehr et al., 2018).

According to self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2000), innate motives – fundamental psychological needs according to the theory's terminology – and/or acquired motives regulate behavior. In contrast to motive-disposition theory which focuses on individual differences, self-determination theory proposes that a person's psychological needs must be satisfied in order to experience growth, well-being and adjustment (Deci & Ryan, 2000; Vansteenkiste, Ryan, & Soenens, 2020). Specifically, three psychological needs are proposed: the need for autonomy, the need for competence and the need for relatedness. The satisfaction of the need for autonomy refers to the feeling that what we are doing is what we want to be doing for our own reasons (i.e., the feeling of self-determination); for the need for competence, it refers to feeling effective and able to get things done; and for the need for relatedness, it refers to feeling connected and belonging to others. Besides these innate motives, learned/acquired motives, state of affairs a person considers as valuable or important, can also regulate behavior (Ryan & Deci, 2000). According to the theory, the effects of acquired motives on experience and behavior, however, depend on how strongly they are associated with the satisfaction of psychological needs (e.g., Deci & Ryan, 2000; Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014). Thus, self-determination theory distinguishes motivation quantity (i.e., strength of intrinsic/extrinsic motivation) from motivation quality, referring to different qualities of extrinsic motivation, and emphasizes the importance of motivation quality

[2] In the current work, I primarily draw on self-determination theory. For an analysis of theoretical commonalities and differences between self-determination theory and motive-disposition theory see, for example, Kehr (2004) or Sheldon and Schüler (2011, 2015).

for motivation-related outcomes (cf. Ryan & Deci, 2000; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009).

Motive-disposition theory and self-determination theory share the notion that people acquire (explicit) motives against the background of social and cultural influences; moreover, both theories propose that people can provide information about their explicit motives. However, they differ in how they conceptualize psychological needs. Motive-disposition theory conceptualizes psychological needs as motivating forces, as urges to pursue certain classes of incentives; its motive concept is about inter-individual differences in need strength depending on early affective learning experiences (McClelland & Pilon, 1983). Self-determination theory conceptualizes psychological needs as experiential rewards, as fundamental requirements for a person's well-being and growth (e.g. Ryan, 1995; Vansteenkiste et al., 2014). However, there are also conceptual overlaps between the two approaches to needs (cf. Sheldon & Schüler, 2011, 2015): Findings from Sheldon and Schüler (2011), for example, suggest that while the fulfillment of psychological needs positively affects well-being for all people, the promise of need fulfillment motivates some people more than others. Furthermore, a study by Hofer and Busch (2011) demonstrates that implicit need strength affects how far experiences of need-fulfillment are linked with satisfaction.

Researchers have speculated about similarities between the concept of implicit/explicit motive congruence/discrepancy (cf. Brunstein, 2018) and the concept of motive quality, where motives of higher quality are characterized by higher degrees of self-determination and need-fulfillment (cf. Ryan & Deci, 2000). Brunstein (2018), for one, argues that a "self-determined approach to goal setting" (p. 395) helps to attune explicit goals to implicit motives. Similarly, Grund, Fries and Rheinberg (2018) suggest that more self-determined forms of motivation mirror motive congruence "in terms of functional effects for self-regulation" (p. 444).

3.1.3 Different Types of Motivation and Associated Outcomes

Every time a person perceives incentives and thereby experiences motivation, motives are involved. Depending on what kinds of motives are activated and where incentives are perceived (in the activity itself, its outcomes and/or consequences) researchers distinguish different types of motivation (see Locke & Schattke, 2018; Kehr, 2004; Deci & Ryan, 2000). Self-determination theory, for instance, pursues a multidimensional conceptualization of motivation and distinguishes intrinsic motivation from different qualities of extrinsic motivation and amotivation (Ryan & Deci, 2000, 2020). However, self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2000) does not use the term *incentive* and rarely uses the term *motive*; instead it speaks of *reasons* regulating behavior.

3.1.3.1 Intrinsic Motivation

Basically, in instances of *intrinsic motivation*, positive activity-related incentives energize behavior. Here, a rewarding feeling lies in the behavior, and, as a consequence, one likes or wants "the activity for its own sake" (Locke & Schattke, 2018, p. 3); thus, the focal activity is experienced as an end in itself (Kehr, 2004; Rheinberg & Engeser, 2018).

Self-determination theory defines intrinsic motivation "as the doing of an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000, p. 56). In instances of intrinsic motivation, basic psychological needs are fulfilled by the momentary behavior (e.g., Deci & Ryan, 2000). Convergent empirical evidence demonstrates that intrinsic motivation is associated with the experience of enjoyment (e.g., Waterman, 2005) and interest (e.g., Schwartz & Waterman, 2006), as well as with increased subjective well-being (e.g., Burton, Lydon, D´Alessandro, & Koestner, 2006), endurance (e.g., Schüler, Wegner, & Knechtle, 2014) and performance quality (e.g., Cerasoli, Nicklin, & Ford, 2014). Intrinsic motivation is furthermore negatively associated with burnout (e.g., Rawolle, Wallis, Badham, & Kehr, 2016) or turn-over intentions (e.g., Kuvaas, Buch, Weibel, Dysvik, & Nerstad, 2017).

Interestingly, besides its many positive effects, being solely intrinsically motivated can also have its downsides: Intrinsic motivation in one task can, for example, reduce performance in other, less interesting tasks (Shin & Grant, 2019); moreover, intrinsic motivation alone may not be enough to attain long-term goals (Burton et al., 2006; Sansone, & Thoman, 2005).

However, in everyday life, people often don't find pleasure or enjoyment in activities they engage in, but act in anticipation of future consequences only. Acting for reasons other than a behavior's inherent satisfaction corresponds to extrinsic motivation (e.g., Schattke & Locke, 2018; Ryan & Deci, 2000, 2020).

3.1.3.2 Different Qualities of Extrinsic Motivation

When people are extrinsically motivated, explicit motives are activated and purpose-related incentives motivate behavior. Here, the focal activity is ultimately a means to an end, for example when students learn for an exam only to get a good grade (i.e., approach a reward), or employees invest effort, only to avoid negative feedback (i.e., avoid punishment).

Organismic integration theory (see for example Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010), a sub-theory of self-determination theory, proposes that in instances of *extrinsic motivation*, qualitatively different kinds of reasons/motives can regulate behavior (see Figure 1). In this regard, the theory proposes that reasons regulating behavior can vary in their degree of self-determination (e.g., Ryan & Deci, 2000). Organized along the line of increasing self-determination, organismic integration theory distinguishes external,

introjected, identified and integrated reasons (e.g., Deci & Ryan, 2000). Whereas external reasons for engaging in an activity are associated with expected rewards, demands or punishments, introjected reasons are associated with anticipated pride and feelings of shame or guilt, in other words, internal rewards and punishments. External and introjected reasons are both somewhat "alien to one's sense of self" (Vansteenkiste et al., 2018, p. 31). When aggregated, they correspond to controlled extrinsic motivation, also termed "have-to motivation" (e.g., Werner & Milyavskaya, 2019). Identified reasons, however, are associated with what is valuable and personally important; and integrated reasons are associated with deep anchored values and needs. These two kinds of reasons are relatively self-relevant, personally meaningful reasons (Vansteenkiste et al., 2018); when aggregated, they correspond with autonomous extrinsic motivation, also termed "want-to motivation" (Werner & Milyavskaya, 2019).[3] When autonomous reasons regulate behavior, "feelings of choice, interest, deep personal relevance, and internal causality underlie the experience" (Legault & Inzlicht, 2013, p. 123; Deci & Ryan, 2000).

Autonomous motivation, compared to controlled motivation, is seen, however, as high-quality extrinsic motivation, because it is associated with a plethora of desirable outcomes (e.g., Gagné & Deci, 2005; Ryan & Deci, 2006; Deci, Olafsen, & Ryan, 2017): Studies show, for example, that autonomous motivation, in contrast to controlled motivation is typically associated with the experience of energizing interest, enjoyment and vitality (e.g., Ryan, Bernstein, & Brown, 2010; Nix, Ryan, Manly, & Deci, 1999; Muraven, Gagné, & Rosman, 2008), positive emotions (e.g., Ketonen, Dietrich, Moeller, Salmela-Aro, & Lonka, 2018), ease during goal pursuit (e.g., Werner, Milyavskaya, Foxen-Craft, & Koestner, 2016) as well as goal progress (e.g., Koestner, Powers, Milyavskaya, Carbonneau, & Hope, 2015). Controlled motivation, however, is seen as low-quality extrinsic motivation (Trépanier, Forest, Fernet, & Austin, 2015; Vansteenkiste et al., 2009). In instances of controlled motivation, the going gets tough and people feel that they should or have to engage in the focal activity (Koestner, Otis, Powers, Pelletier, & Gagnon, 2008; Werner & Milyavskaya, 2019; Werner et al., 2016). Accordingly, research shows that controlled motivation compared to autonomous motivation is associated with the experience of more inner obstacles and temptations during goal pursuit (Milyavskaya, Inzlicht, Hope, & Koestner, 2015) and, therefore, more effort (e.g., Werner et al., 2016). Furthermore, studies show that in contrast to autonomous motivation, controlled motivation is negatively associated with, for example, activity engagement and performance (e.g., Jang, 2008; Slemp, Kern, Patrick, & Ryan, 2018; Steingut et al., 2017), effort

[3] A distinction between intrinsic motivation and autonomous extrinsic motivation is, that when intrinsically motivated, people engage in activities "because they find them engaging or even fun, whereas identified and integrated motivations are based on a sense of value—people view the activities as worthwhile, even if not enjoyable" (Ryan & Deci, 2020, p. 4). However, some researchers suggest to consider intrinsic motivation a "completely autonomous form of motivation" (Howard, Gagné, & Bureau, 2017, p. 5).

investigation (e.g., Werner & Milyavskaya, 2019), persistence (Critcher & Ferguson, 2016; Deci, Eghrari, Patrick, & Leone, 1994), and well-being (e.g., Deci & Ryan, 2008; Ketonen et al., 2018; Thibault Landry et al., 2016).

Type of Motivation	Extrinsic motivation				Intrinsic motivation
	Controlled		Autonomous		
Type of Regulation	External regulation	Introjected regulation	Identified regulation	Integrated regulation	Intrinsic regulation
Motivational force	Commands, rewards, punishments	Guilt, shame, pride	Personal significance and value, relevance	Congruence with one's other values and needs	Interest, enjoyment, curiosity
Internalization	Lack of internalization	Partial	Full	Fullest	Not required
Perceived self-relevance	Low	Medium	High	Very high	-

Figure 1. Overview of different types of regulation within self-determination theory (adapted from Ryan & Deci, 2000; see also Vansteenkiste et al., 2018).

Thus, in instances of extrinsic motivation, the type of motivation varies as a function of how much the reasons for an action are self-determined. From lesser to greater self-determination/motivation quality, organismic integration theory places the types of reasons along a continuum, termed *internalization continuum* (Ryan & Deci, 2000; Vansteenkiste et al., 2010).[4] Accordingly, increasing internalization corresponds with increasing motivation quality (Ryan & Deci, 2008; Koestner et al., 2015; Vansteenkiste & Ryan, 2013; Vansteenkiste et al., 2018) and "contributes to elevated need satisfaction" (Vansteenkiste & Ryan, 2013, p. 10).

In line with the theoretical underpinnings, research shows in this regard that increasing internalization is associated with increased autonomous motivation (see Vansteenkiste et al., 2018); furthermore, research shows that increasing internalization fosters energy (Menges, Tussing, Wihler, & Grant, 2017; Muraven et al., 2008; Ryan & Deci, 2008), supports activity engagement (see Werner & Milyavskaya, 2019), decreases the experience of obstacles (e.g., Werner et al., 2016) and effort (Sheldon & Elliot, 1998), bolsters "self-regulation by amplifying brain-based sensitivity to self-regulation failure" (Legault & Inzlicht, 2013, p. 124), and maintains or even enhances subjective vitality (Martela, DeHaan, & Ryan, 2016).

Obviously, however, different reasons can also simultaneously regulate behavior and, thus, different forms of motivation can exist simultaneously (e.g., Howard et al., 2016). Regarding this issue, Howard et al. (2017) conclude in view of their meta-analytic findings:

[4] This internalization continuum is, however, synonymous with the self-determination continuum as well as with the continuum of relative autonomy; according to organismic integration theory, greater internalization corresponds to a satisfaction of psychological needs (see for example Ryan & Deci, 2000).

> [T]he quality of one's motivation may be more important than quantity of motivation, meaning that the quality of one's reasons for doing something (i.e., autonomous) is more important than one's overall quantity of motivation (i.e., one's total motivation comprising both controlled and autonomous reasons). (p. 1373)

As long as autonomous types of motivation prevail, outcomes are still positive (see Gillet, Morin, & Reeve, 2017; Howard et al., 2016).

3.1.3.3 Amotivation

When a person does not perceive any incentive in a given situation, no motive is activated and, therefore, no motivational tendency is elicited (cf. Heckhausen & Heckhausen, 2018). In other words, in such instances, a person does not perceive any reason to engage in a given activity and, consequently, does not experience any (type of) motivation. In the taxonomy of self-determination theory, this state is termed amotivation (Ryan & Deci, 2000).

In sum, situational stimuli that become the focus of attention, elicit motivation when people relate them (unconsciously or consciously) to personal motives (see also Duckworth et al., 2014). The concrete motivational experience as well as the behavior's "form, direction, intensity, and duration" (Pinder, 2008, p. 11; Burton et al., 2006; Steingut et al., 2017), however, depends on the resulting type of motivation: intrinsic motivation or different types of extrinsic motivation. Self-determination theory proposes a multidimensional conceptualization of extrinsic motivation comprising autonomous (high-quality) and controlled (low-quality) extrinsic motivation; whereas the former facilitates well-being and behavior-related outcomes, the latter is associated with several detrimental consequences in general and more inner hindrances in particular (Milyavskaya et al., 2015; Werner et al., 2016; Werner & Milyavskaya, 2019). Multiple motives can simultaneously motivate behavior, whereas predominant activated motives determine the consequences.

Against the background of this understanding of motivation, its different types and associated outcomes, I will now outline a conceptualization of insufficient motivation.

3.1.4 Insufficient Motivation

The term *insufficient motivation* is used primarily in research drawing on motive-disposition theory (McClelland, 1985; see also Kehr, 2004). In functional terms, insufficient motivation relates to instances where implicit motives (i.e., needs) and explicit motives (e.g., goals) are incongruent, typically referred to as motive-discrepancies (e.g., Brunstein, 2018;

Kehr et al., 2018) or motivational incongruence (Grund, Fries, & Rheinberg, 2018). According to the theory, these motive discrepancies cause intrapsychic/self-regulatory conflicts (see for example McClelland et al., 1989) which may manifest as motivational barriers with regard to the pursuit of goals (Brunstein, 2018; Kehr, 2004).

In instances of insufficient motivation, intrinsic motivation toward the focal activity is lacking (Kehr, 2004; Sokolowski, 1993); while activated explicit motives encourage activity engagement, the "behavior is insufficiently energized by implicit motives" (Kehr, 2004, p. 485).[5] Accordingly, insufficient motivation is confined to instances of extrinsic motivation.

3.1.4.1 The Two Intrapsychic Conflicts Associated With Insufficient Motivation

Typically, two intrapsychic conflicts are associated with insufficient motivation (see for example Hoyle & Davisson, 2016; Kehr, 2004): On the one hand, there is the conflict associated with need-discrepant goal pursuit and, on the other hand, there is the conflict associated with behavioral impulses interfering with goal pursuit.

When people pursue need-discrepant goals, cognitive preferences lack the energizing support of aroused implicit motives ("I should/have to, but I don't want to"). In such instances people might feel the need to initiate and/or persist in an activity, but lack interest (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010; Thoman, Sansone, & Geerling, 2017) or enjoyment toward it (Kehr, 2004; Kehr et al., 2018); they either find the focal activity boring (van Hooff & van Hooft, 2017; van Tilburg & Igou, 2012) or - in cases where negative activity-, or consequence-related incentives are involved - they will find the insufficiently motivated activity aversive (Hennecke, Czikmantori, & Brandstätter, 2019; Miele & Scholer, 2018). This is the case, for example, when an employee feels that he has to complete a subjectively boring work assignment or when he wants to avoid the task because he expects it to be unpleasant (cf. Hennecke et al., 2019).

The other common intrapsychic conflict refers to instances where behavioral impulses that are due to the arousal of implicit motives interfere with goal pursuit ("I want to, but I shouldn't"). In this instance a person has cognitive preferences regarding an activity, but at the same time experiences affective preferences regarding another activity (i.e., temptation). This is the case, for example, when an employee has to complete a task but gets distracted by incoming emails or when a student had planned to study but is tempted to go for coffee with friends instead.

[5] Note that insufficient motivation is different from lacking motivation or amotivation, which both describe the absence of motivation (cf. Ryan & Deci, 2000; Legault, Green-Demers, & Pelletier, 2006).

3.1.4.2 Insufficient Motivation in Terms of Self-Determination Theory

Although self-determination theory does not use the term insufficient motivation, it is reasonable to assume that insufficient motivation and controlled/low-quality motivation are similar in respect of their rather dysfunctional effects on well-being and behavior (see Sheldon & Schüler, 2011; Grund et al., 2018). Self-determination theory proposes that controlled forms of motivation require more energy than autonomous forms of motivation because the latter corresponds to greater need satisfaction (see chapter 3.1.3.2). For example, it takes more energy to empty one's dish washer when an individual feels obligated to do so (controlled motivation) than when they want to do it (autonomous motivation). Accordingly, I suggest that controlled (vs. autonomous) forms of extrinsic motivation relate to instances of greater (vs. smaller) motive-discrepancies and, thus, to greater (vs. smaller) motivational barriers.

Extensive research drawing on self-determination theory shows that explicit goals incongruent with psychological needs (instances of controlled/low-quality motivation), compared to more-self-determined goals (instances of autonomous/high-quality motivation), are negatively associated with well-being-related (e.g., Ryan & Deci, 2008) and performance-related outcomes (e.g., Burton et al., 2006; Manganelli, Thibault Landry, Forest, & Carpentier, 2018; Muraven, et al., 2008; Muraven, Rosman, & Gagné, 2007). Similarly, convergent evidence from studies drawing on motive-disposition theory shows that insufficient motivation negatively affects well-being-related outcomes (e.g., Baumann, Kaschel, & Kuhl, 2005; Brandstätter, Job, & Schulze, 2016; Kehr, 2004b; Kazén & Kuhl, 2011; Rawolle et al., 2016). Moreover, in instances of insufficient motivation, people tend to procrastinate (e.g., Gröpel & Steel, 2007; Metin, Taris, & Peeters,, 2016; Rozental & Carlbring, 2014) as well as show decreased performance levels (e.g., Trapp & Kehr, 2016; Gröpel & Kehr, 2013).

Thus, in terms of self-determination, I suggest that insufficient motivation relates particularly to instances where a person's motivation toward an activity is controlled and autonomous rationales are not salient or even lacking (i.e., low motivation quality).

Taken together, in contrast to amotivation, which describes the absence of motivation, insufficient motivation refers to instances of motive-discrepancies (e.g., Kehr, 2004) and accordingly – in terms of self-determination theory – to instances of controlled motivation (Ryan & Deci, 2000). Here, people pursue a goal, but simply don't feel sufficiently energized to fully engage in related activities and/or fall prey to temptations and distractions (e.g., Kehr, 2004; Milyavskaya et al., 2015).[6]

[6] From an incentive theory perspective, insufficient motivation refers to instances where activity-related positive-incentives are absent and the perception of purpose-related incentives motivates behavior (Rheinberg & Engeser, 2018). While the behavior is driven by perceived positive (e.g., reward) or negative (e.g., punishment) purpose-related incentives, the focal activity is experienced as boring (no activity-related incentive) or even aversive (negative activity-related incentive).

Surprisingly, no research in the field of self-determination theory has pursued the question as to whether people can actively regulate and shift their own motivational states in order to overcome insufficient motivation; in this field of research, a primary focus lies typically on socio-environmental factors shaping individual motivation. Thus, in the following chapters, I will draw on theories and frameworks which propose that people can regulate motivational states via self-regulation (e.g., Duckworth et al., 2014) or, in other words, volitional regulation (e.g., Kehr, 2004). Furthermore, I will argue when and how I expect positive reappraisal to be effective as a volitional strategy.

3.2 Volition: Overcoming Insufficient Motivation

3.2.1 (Insufficient) Motivation and Volition

While motivational states result from a person-situation interaction (cf. chapter 3.1.), overcoming insufficient motivation or, in other words, regulating motivational states, requires *self-regulation*/*volitional regulation* (e.g., Kehr, 2004).[7] More specifically, volitional regulation helps one to deal with intrapsychic conflicts caused by motive-discrepancies; it can be considered effective when it resolves the intrapsychic conflict and, thereby, supports goal pursuit (e.g., Kehr, 2004; Kotabe & Hofmann, 2015; Myrseth & Fishbach, 2009).

Both insufficient motivation as well as volitional regulation are confined to instances of extrinsic motivation (cf. Kehr, 2004). However, in terms of self-determination theory, I argue that "it is reasonable to assume that more self-determined forms of extrinsic motivation (such as integration and identification) require less volitional regulation than less self-determined forms (such as introjection or external regulation)" (Kehr, 2004b, p. 325). Thus, I conclude that while the initiation and maintenance of controlled motivated behavior requires volitional regulation, engaging in autonomously motivated behaviors might require only a little or even no volitional regulation.

Importantly, this conceptualization of volition differs from a "sense of volition" (i.e., autonomy, Deci & Ryan, 2000) and refers to volition with a twofold function (e.g., Duckworth, Milkman, & Laibson, 2018; Kehr, 2004).

3.2.2 The Twofold Function of Volition

In accordance with the two intrapsychic conflicts typically associated with insufficient motivation (cf. chapter 3.1.4.1), volition is usually considered to have a twofold function (Grund, Grunschel, Bruhn, & Fries, 2015; Kehr, 2004; Myrseth & Fishbach, 2009; for an overview see, for example, Carnevale & Fujita, 2016; Duckworth et al., 2018; Milyavskaya, Berkman, & De Ridder, 2019). Correspondingly, people require volition when they want to pursue a need-discrepant goal, in other words, when they want to act in absence of affective preferences; here, effective volitional regulation supports cognitive preferences. Moreover, people require volition when they face temptations or distractions, in other words, when they want to act against affective preferences; in such cases, effective volitional regulation controls the

[7] Motivation deficits can come from either insufficient motivation or from insufficient abilities, causing expectancy problems in the face of subjectively too difficult or complicated tasks (Engelschalk, Steuer, & Dresel, 2016; Kehr, 2004; Rheinberg & Engeser, 2018). In accordance with the propositions of the 3C-model (Kehr, 2004), I argue that in order to overcome insufficient motivation, people require volitional regulation; in order to overcome expectancy problems, however, people require problem solving strategies.

behavioral impulse associated with the temptation/distraction (cf. Brunstein, 2018, p. 391; Kehr, 2004; Kehr & v. Rosenstiel, 2006; Kehr et al., 2018).

However, each function of volition relates to sets of volitional (or self-regulatory) strategies which can be understood as the "means through which individuals, in order to help themselves achieve their goals, actively alter their cognitive, motivational, affective, or behavioral reactions" (Hennecke et al., 2019, p. 4).

Volition in its function to support cognitive preferences in the absence of affective preferences (or even despite feelings of aversion) refers to a set of strategies which are initiation- or persistence-related (e.g., starting or completing an uninteresting work assignment; cf. Hoyle & Davisson, 2016).[8] Such strategies are typically associated with processes through "which individuals purposefully act to initiate, maintain, or supplement their willingness to start, to provide work toward, or to complete a particular activity or goal" (Wolters, 2003, p. 190); they relate to motivation control (Kuhl & Fuhrmann, 1998), self-regulation (e.g., Gillebaart, 2018; Grund et al., 2018; Kuhl & Fuhrmann, 1998), self-motivation (Fröhlich & Kuhl, 2003; Kazén, Kuhl, & Leicht, 2015), motivational regulation (e.g., Engelschalk et al., 2016; Schwinger & Stiensmeier-Pelster, 2012; Miele & Scholer, 2018), value regulation (e.g., Wolters & Benzon, 2013), or interest-enhancement (e.g., Sansone, Weir, Harpster, & Morgan, 1992; Sansone & Thoman, 2005).[9]

Volition in its function to act against affective preferences refers to strategies which are associated with processes through which people can "control impulses emanating from a latent motive that impede the realization of consciously selected goals, values, and norms" (Brunstein, 2018, p. 391; see also Duckworth et al., 2016; Hoyle & Davisson, 2016; Kehr, 2004). This function of volition refers to a set of strategies which are inhibition-related (e.g., Hoyle & Davisson, 2016; Kehr, 2004). Thus, these strategies typically relate to the resolution of a self-control dilemma (e.g., Carnevale & Fujita, 2016), self-control (Carnevale & Fujita, 2016), effortful and effortless self-control (e.g., Gillebaart & de Ridder, 2015), impulse control (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Milyavskaya & Inzlicht, 2017), control motivation (e.g., Kotabe & Hofmann, 2015), and willpower (e.g., Metcalfe & Mischel, 1999).[10]

[8] Regarding this issue, Schwinger and Stiensmeier-Pelster (2012) distinguish base-building from keep-going strategies.

[9] Kuhl and Fuhrmann (1998) propose that this function of volition might also involve emotion control when fear motives are activated.

[10] Some researchers doubt the use of most inhibition-related strategies and argue that "willpower is overrated" (see Inzlicht & Friese, 2020); specifically, they argue that situational strategies (e.g., Duckworth et al., 2016) and habit formation (e.g., Wood, 2017) are key in dealing with temptations.

3.2.3 Types of Volitional Strategies

Beyond their different functions, researchers classify volitional strategies into different types. As volitional strategies have been investigated within a number of theoretical frameworks, there are various approaches to classify them (see for example, Duckworth et al., 2014, 2016; Hennecke & Bürgler, 2020; Kuhl & Fuhrmann, 1998; Schwinger, von der Laden, & Spinath, 2007). In the current work, I draw on the process model of self-regulation (Duckworth et al., 2014, 2016) as a classification system.

The process model of self-regulation (e.g., Duckworth et al., 2014) builds on the well-established process model of emotion-regulation (Gross, 1998, 2015) and highlights the fact that attention and appraisal processes precede motivational tendencies in a given situation. Accordingly, the model proposes that volitional strategies can generally speaking address either the outer, or the inner/intrapsychic situation (Duckworth et al., 2016). Whereas situational strategies target the physical or social environment (i.e., outer situation); intrapsychic strategies target attentional processes, appraisal processes, or the motivational tendency respectively (i.e., inner situation; see Duckworth et al., 2016; Hennecke et al., 2019). To give an example: In order to support the goal to complete a mandatory, but boring project task, an employee could grab a steaming cup of deliciously smelling coffee and play his favorite playlist on Spotify (i.e., situational strategies) and/ or visualize why the task, despite its boring nature, is an important part of the larger project (i.e., intrapsychic, cognitive strategy). The model classifies situational strategies as situation selection strategies or situation modification strategies respectively; intrapsychic strategies are, however, classified as either attentional deployment strategies, cognitive change strategies or response modulation (see Duckworth et al., 2016; Hennecke & Bürgler, 2020).

Whereas situational compared to intrapsychic strategies are more effective in respect to successfully dealing with temptations (see Duckworth et al., 2016), research in the field of interest-enhancement suggests that intrapsychic strategies are more effective in supporting cognitive preferences with respect to activity engagement and persistence (e.g., Green-Demers, Pelletier, Stewart, & Gushue, 1998; Nett, Goetz, Daniels, 2010).

Together, overcoming insufficient motivation requires volitional regulation. Such volitional strategies generally fall into two categories. There are those which help people to regulate motivational states by changing their circumstances, and those which help people to regulate motivational states by changing themselves. Whereas the former involve modifying or even changing the situation, the latter involve either changing how one relates to the focal activity in terms of attention or appraisal or by controlling one's motivational impulse (see Kehr & v. Rosenstiel, 2006; Duckworth et al., 2014).

In the following chapter, I will argue that positive reappraisal is a promising volitional cognitive change strategy (type) which helps to support cognitive preferences (function). Furthermore, I will demarcate it from conceptually similar strategies. In order to make predictions regarding its effectiveness, I will then argue when and how I expect positive reappraisal to support cognitive preferences and, thereby, to help overcome instances of insufficient motivation.

3.3 Positive Reappraisal as a Volitional Cognitive Change Strategy Supporting Cognitive Preferences

In research on emotion regulation (e.g., Shiota & Levenson, 2009, 2012) and coping (e.g., Folkman, 1997; Folkman & Moskowitz, 2000), the beneficial impact of *positive reappraisal* is well-established (e.g., Jamieson et al., 2018; Nowlan et al., 2015; Webb et al., 2012). Despite these encouraging findings from emotion-regulation research and despite the theoretical proximity between emotional reactions and motivational tendencies (Duckworth et al., 2014; 2016), the field of motivation and self-regulation research has largely neglected the potential effectiveness of positive reappraisal as a volitional strategy – a clear definition and thorough conceptualization is still lacking.

A nuanced examination of positive reappraisal as a volitional strategy in the context of insufficient motivation requires, however, the following: First, defining and classifying positive reappraisal as a volitional strategy and demarcating it from conceptually similar strategies (i.e., "What is it?"); second, uncovering factors which allow to predict its effect in instances of insufficient motivation (i.e., "When is it effective?"); third, describing the hypothesized psychological process underlying the strategy's effectiveness (i.e., "How can we explain its effectiveness?").

3.3.1 Definition, Classification and Demarcation

3.3.1.1 Definition of Positive Reappraisal as a Volitional Strategy

Reappraisal refers to the process of deliberately changing an existing appraisal (cf., McRae, 2016; Ochsner & Gross, 2005), which is defined as "the cognitive evaluation of the nature and significance of a phenomenon or event" (American Psychological Association, n.d.; see also Moors, Ellsworth, Scherer, & Frijda, 2013).

However, *positive reappraisal* is a sub-type of the broader concept of reappraisal.[11] In emotion regulation research, it generally refers to "cognitive strategies for reframing a situation to see it in a positive light" (Folkman & Moskowitz, 2000, p. 650). Related studies usually define positive reappraisal as reinterpreting the meaning of a negative or stressful experience by discovering and visualizing its positive aspects (Folkman & Moskowitz, 2000; Shiota & Levenson, 2009, 2012); thus, its implementation is typically understood as an "adaptive process through which stressful events are re-construed as benign, beneficial, and/or

[11] Besides the name positive reappraisal (e.g., Folkman & Moskowitz, 2000; Garland et al., 2011), in research on coping the strategy has been the subject of studies under different names, such as positive reframing (e.g., Ranney et al., 2016), benefit-finding (e.g., Gao et al., 2014), or positive reinterpretation (e.g., Carver, Scheier, & Weintraub, 1989).

meaningful" (Garland et al., 2011, p.60). Table 1 displays examples of how positive reappraisal is understood in research on emotion-regulation and coping.

Table 1

Positive Reappraisal in Research on Emotion-Regulation and Coping (Examples)

	Reference	Definition/Description	Items/Instruction
Positive reappraisal	Folkman and Moskowitz (2000)	"Positive reappraisal refers to cognitive strategies for reframing a situation to see it in a positive light (seeing a glass half full as opposed to half empty)" (p. 650).	
	Garland, Gaylord and Park (2009)	"Positive reappraisal, a form of meaning-based coping, is the adaptive process by which stressful events are re-construed as benign, valuable, or beneficial" (p. 2).	• I think I can learn something from the situation • I think I can become a stronger person as a result of what has happened • I think that the situation also has its positive sides • I look for the positive sides to the matter (see also Garnefski, Kraaij, & Spinhoven, 2001)
	Shiota and Levenson (2009)	"positive reappraisal keeps one's focus on the emotional aspects of the situation, reinterpreting these aspects' meaning" (p. 3).	please try to think about positive aspects of what you are seeing

There is mounting evidence that speaks for its benefits for various emotion-related outcomes (e.g., Aldao et al., 2010; Jamieson et al., 2018; Webb et al., 2012).

In research on motivation and volition, positive reappraisal has thus far been conceptualized only in passing, in contrast to emotion-regulation research. Kehr and von Rosenstiel (2006) have, for example, categorized *reframing* – an alternative term for reappraisal – as a volitional strategy potentially supporting cognitive preferences; they suggested furthermore to assign it to motivation control, which relates to the consideration of "positive incentives concerning the matter" (Kuhl & Fuhrmann, 1998, p. 23)**.**

In the current work, I propose the following definition: Positive reappraisal as a volitional strategy refers to the process of deliberately discovering and visualizing additional positive incentives for engaging in an otherwise insufficiently motivated behavior. In other words, I propose that in terms of motivation, positive reappraisal involves reconsidering motives for an insufficiently motivated activity and connecting it to additional motives; when deployed successfully, this process then changes the activity's incentive structure in a positive way and results in a more-motivating appraisal.

For an illustration of the strategy's deployment, I will use the example of an employee who has to complete a tedious work assignment for his supervisor (i.e., an instance of

insufficient motivation). In this instance, the employee could, in addition to feeling obliged, positively reappraise the assignment he feels insufficiently motivated for, by visualizing positive incentives that address what he can learn from it or why it could be personally useful to engage in the task. As a result, he might visualize that completing the assignment could train his self-discipline or that aspects of the assignment would be beneficial for his future career (i.e., motives); this, however, should positively influence the existing appraisal of the focal activity and, thereby, support the employee's motivation to engage in it.

3.3.1.2 Classification of Positive Reappraisal as a Cognitive Change Strategy

My theoretical framework for classifying positive reappraisal as a volitional strategy is the process model of self-regulation (Duckworth et al., 2014; 2016). Here, attempts to change appraisals in order to alter motivational tendencies in a given situation are subsumed under the term cognitive change (see also Gross, 2015). Cognitive change "refers to the way in which people can either strategically transform the relevance of a stimulus to their goal, or change the goal against which they compare the stimulus." (Magen & Gross, 2010, p. 345). Consequently, I classify positive reappraisal as a volitional cognitive change strategy. In accordance with Kehr und von Rosenstiel (2006) I classify it more specifically as a motivation control strategy (cf. Kuhl & Fuhrmann, 1998). Thus, its function as a volitional strategy is to help overcoming insufficient motivation by making "goals more appealing" (Duckworth et al., 2014, p. 209), or, in other words, by supporting the pursuit of need-discrepant goals.

I would like to highlight that there are different kinds of reappraisal: Whereas in the current work, I conceptualize positive reappraisal as an initiation-and persistence-related strategy (e.g., Hoyle & Davisson, 2016; Kehr & von Rosenstiel, 2006), other researchers (e.g., Mischel et al., 2011) have conceptualized and examined reappraisal as an inhibition-related strategy; there it refers to the "reframing of a situation away from the 'hot', appetitive or consummatory features of the tempting stimuli toward 'cooler' representations" (Mischel et al., 2011, p. 253). Thus, I suggest a distinction which is similar to the distinction drawn in emotion research between positive reappraisal (e.g, Garland et al., 2011) and cognitive (e.g., McRae, Ciesielski, & Gross, 2012) or detached reappraisal (Shiota & Levenson, 2009): Whilst positive reappraisal is expected to support cognitive preferences in instances of insufficient motivation, reappraisal as conceptualized by Mischel and his colleagues (2011) helps to deal with behavioral impulses that impede goal pursuit (i.e., temptations).

3.3.1.3 Demarcation of Positive Reappraisal From Conceptually Similar Strategies

I propose that two features characterize positive reappraisal as a volitional cognitive change strategy: First, based on the understanding of volitional regulation as described in

chapter 3.2., I propose that a necessary condition for being an effective volitional strategy is that the strategy helps in overcoming instances of insufficient motivation. Second, I propose furthermore that the sufficient condition for positive reappraisal as a volitional strategy is the deployment of a positive reappraisal process which involves the discovery and visualization of additional positive incentives for engaging in the focal activity. In combination, these two features help to demarcate positive reappraisal from conceptually similar strategies.

In the following I will outline how several strategies from motivation and self-regulation literature conceptually relate and can be contrasted to positive reappraisal. Specifically, I will demarcate positive reappraisal to *providing oneself self-relevant rationales* (Green-Demers et al., 1998), *enhancement of personal significance* (e.g., Schwinger, Steinmayr, & Spinath, 2009), *self-motivation* (e.g., Kazén et al., 2015), *focusing on positive consequences* (Hennecke et al., 2019), and *utility value interventions* (e.g., Canning & Harackiewicz, 2015; Hulleman et al., 2010; Hulleman & Harackiewicz, 2009; Hulleman, Kosovich, Barron, & Daniel, 2017). Despite the fact that these strategies/interventions emerged from different research traditions within motivation and self-regulation literature, they show the commonality that they aim to enhance motivation (see Table 2 for a more detailed description of related strategies/interventions).

Table 2

Volitional Strategies and Motivational Interventions That are Conceptually Similar to Positive Reappraisal

Conceptually Similar Volitional/Self-Regulatory Strategies			
Strategy	**Reference**	**Definition/Description**	**Items/Instructions**
Providing oneself self-relevant rationales	Green-Demers et al. (1998)	"[T]he strategy wherein the athlete approaches the task with personally valid reasons for its performance as a means to overlook feelings of disinterest. An athlete who reminds himself or herself of the benefits to be gained from performing a boring task is using a rationale to increase interest." (p. 253)	• I don't worry about whether or not I like the activity, I just do it. • As long as I have a good reason for performing the task, it doesn't matter if it's not that interesting. • I realize that the activity will help me achieve my goals, so I just do it. • I take the attitude that the task must be done regardless.
Enhancement of personal significance	Schwinger et al. (2009)	"assembling relations between the task and the person's individual interests and preferences" (p. 621)	• I look for connections between the tasks and my life as such. • I strive to relate the learning material to my own experiences. • I try to establish relations between work and my personal interests.
Self-motivation	Kazén et al. (2015)	"asking participants to generate their own method for enhancing their motivation for the to-be carried-out tasks (e.g.,	Try out to motivate yourself to do the tasks. Each of us knows one or two tricks to do that. *It could be to associate something meaningful, personally relevant,*

		finding some personal meaning in the task at hand)" (p. 7)	*or interesting with a to-be-carried out difficult or boring task.* Some people motivate themselves by fully identifying themselves with the task, or are able to immerse themselves in the task. Think about the best way to motivate yourself to carry out such tasks.
Focusing on positive consequences	Hennecke et al. (2019)	"Thinking of positive consequences from pursuit of the activity, the promotion/approach goals that motivated the activity: responses usually include reference to a desirable outcome" (p. 107)	• I remind myself why I perform the activity and think of its positive consequences (item from Pilot Study 2a)

Conceptually Similar Motivational Interventions

Intervention	Reference	Definition/Description	Instructions
Utility value intervention (field study)	e.g., Hulleman et al. (2010)	"a situational intervention that encourages individuals to make a connection between a task and their lives (i.e., a relevance intervention)" (p. 882)	Participants in the relevance condition were asked to type a short essay (1–3 paragraphs in length) briefly describing the potential relevance of this technique to your own life, or to the lives of college students in general. Of course, you'll probably need more practice with the technique to really appreciate its personal relevance, but for purposes of this writing exercise, please focus on how this technique could be useful to you or to other college students, and give examples.
Utility value intervention (lab study)	Canning and Harackiewicz (2015)	Self-generated utility value: Situational intervention designed to enhance perceptions of utility value; utility is defined as "the importance or usefulness for other tasks and goals" (p. 2)	Participants in the self-generated UV condition were asked to type a short essay (1 – 3 paragraphs in length) briefly describing the potential relevance of this technique to your own life. Of course, you'll probably need more practice with the technique to really appreciate its personal relevance, but for purposes of this short essay, please focus on how this technique could be useful to you in your own life, and give examples.

Findings with regard to the strategies *providing oneself self-relevant rationales* (Green-Demers et al., 1998) and *enhancement of personal significance* (e.g., Schwinger & Stiensmeier-Pelster, 2012) result from correlational studies using questionnaires that asses the tendency to implement each strategy in order to enhance motivation. Both strategies are understood as self-regulatory strategies and involve the visualization of positive incentives (cf. Table 2). Whilst enhancement of personal significance can be assessed by using a well-validated scale, the scale providing oneself self-relevant rationales was constructed for the purpose of the sports-related study by Green-Demers et al. (1998). Regarding the latter,

however, neither the definition provided, nor the items used in the study allow to conclude, what people actually do when they implement the strategy – the construct is rather vague and differs from my conceptualization of positive reappraisal. In contrast, the strategy enhancement of personal significance is clearly defined as “assembling relations between the task and the person's individual interests and preferences” (Schwinger et al., 2009, p. 621); accordingly, it can be considered as positive reappraisal according to my definition provided above.

To assess the effectiveness of *self-motivation*, Kazén et al. (2015) conducted experimental studies in the lab and presented participants with a challenging task; they did not, however, specify whether the task could be appraised as boring or aversive. Thus, I argue that self-motivation as conceptualized by Kazén et al. (2015) can be considered equivalent to positive reappraisal for those participants who felt insufficiently motivated toward the focal task and, when following the instructions, successfully discovered “some personal meaning” (p. 7) in it. However, the instructions used in the study leave room for implementing various volitional strategies.

Focusing on positive consequences is defined as “thinking of positive consequences from pursuit of the activity, the promotion/approach goals that motivated the activity” (Hennecke et al., 2019, p. 107). At least the first part of the description doesn’t clarify whether the strategy involves a positive reappraisal process or whether it relates to the adoption of an outcome focus (cf. Freund & Hennecke, 2015; Krause & Freund, 2016). Whereas positive reappraisal involves rethinking rationales and thereby connecting the activity to alternative, potentially more-motivating incentives, adopting an outcome focus involves reaffirming why the goal was being pursued in the first place. In this regard, it might be fruitful that future research clarifies whether people deploying this strategy focus on initially perceived purpose-related positive incentives (i.e., adopting an outcome focus) or whether they appraise focal activity in relation to additional positive incentives (i.e., deploying positive reappraisal).

The effectiveness of *utility value interventions* (e.g., Canning & Harackiewicz, 2015; Hulleman & Harackiewiczs, 2009; Hulleman et al., 2010) are typically examined in quasi-experimental field studies. These interventions aim at a general increase of achievement motivation and, thereby, at improved educational outcomes, regardless whether or not intrapsychic conflicts are present. They typically target populations in the academic context with subjectively low abilities toward a matter (e.g. math). Moreover, they are specifically designed to change specific appraisals of, for example, learning material, either by providing people with alternative appraisals or prompting them to self-generate alternative appraisals. The experimental studies conducted by Canning and Harackiewicz (2015) stand in this tradition, but are an exception to such typical utility value interventions as they analyze short-term effects in the lab. Although utility-value interventions might instigate a reappraisal process for those students who feel insufficiently motivated toward the focal task/course material, they

are usually provided to students in order to address long-term motivational trajectories but not to overcome insufficient motivation; therefore, they cannot be considered volitional strategies.

Together, empirical research with regard to emotion-regulation as well as with regard to conceptually similar strategies in motivation and self-regulation literature suggest that positive reappraisal is a highly promising volitional strategy. Even though there seem to exist several conceptually similar strategies, on closer consideration only the strategy enhancement of personal significance seems to be conceptually equivalent. While this strategy has been investigated exclusively in questionnaire studies, the present work investigates its effectiveness in experimental studies and examines its underlying process in more detail. In the following, I will argue when and how I expect it to be effective.

3.3.2 Effectiveness

Generally speaking, the implementation of positive reappraisal can be considered effective when it supports need-discrepant goal pursuit (e.g., Kehr, 2004; Kehr & v. Rosenstiel, 2006). My definition of positive reappraisal as a volitional strategy implies that the strategy yields its effect when it involves the visualization of additional positive incentives. This expectation is in accordance with motivation theory in general (see chapter 3.1) and the process model of self-regulation in particular (e.g., Duckworth et al., 2014). Theoretical considerations as well as empirical findings with regard to self-determination theory (e.g., Ryan & Deci, 2000) strongly suggest, however, that the motivational quality of the motive corresponding to the visualized incentive strongly matters with regard to the strategy's effectiveness.

3.3.2.1 The Strategy's Effectiveness in Light of the Process Model of Self-Regulation

The process model of self-regulation (Duckworth et al., 2014, 2016) suggests that people don't motivationally react to the focal activity, but to the meaning that they attach to it, in other words, to their appraisal of the focal activity. Within any appraisal process, answers are sought to the question regarding the meaning that an experience has, taking motivational concerns (i.e. motives) into account; the resulting appraisal outcome then shapes motivational tendencies (Duckworth et al., 2014). In other words, appraising the focal activity in relation with mental representations of need satisfaction, value realization and/or goal attainment (cf. Beckmann & Heckhausen, 2018; Rheinberg & Engeser, 2018) leads to motivation (see chapter 3.1). However, multiple motives can be important in one instance, which is why the momentary "salience and priority of specific needs, goals, and values are important for shaping [the] response" (Cunningham & Brosch, 2013, p. 56).

Following this logic, deploying positive reappraisal can be expected to boost motivation, when it helps to connect the otherwise insufficiently motivated activity to additional motives corresponding to more-motivating (positive) incentives than the ones that were initially salient.

Questionnaire-based studies from different streams of research are consistent with the notion that people can change appraisals through the visualization of positive incentives and lend support for a self-induced motivation enhancing effect through positive reappraisal (e.g., Green-Demers et al., 1998; Grunschel, Schwinger, Steinmayr, & Fries, 2016; Schwinger & Stiensmeier-Pelster, 2012). Green-Demers et al. (1998) found, for example, that providing oneself self-relevant rationales is positively correlated with intrinsic motivation and self-determined forms of extrinsic motivation as well as interest toward less interesting tasks. Moreover, cognitively connecting insufficiently motivated tasks to personal interests and preferences, a motivation regulation strategy termed enhancement of personal significance (Schwinger et al., 2007), correlates positively with well-being (Grunschel et al., 2016), effort (Schwinger & Stiensmeier-Pelster, 2012) and performance (Kryshko, Fleischer, Waldeyer, Wirth, & Leutner, 2020), and negatively with academic procrastination (Grunschel et al., 2016).

However, research drawing on self-determination theory (e.g., Ryan & Deci, 2000) demonstrates that an anticipated incentive's effect strongly depends on the motivational quality of the corresponding motive (e.g., Howard & Gagné, 2017; Steingut et al., 2017). Thus, in the following I will argue from a self-determination theory perspective when and how I expect positive reappraisal to support cognitive preferences.

3.3.2.2 The Strategy's Effectiveness in Light of Self-Determination Theory

In instances of extrinsic motivation, self-determination theory (e.g., Ryan & Deci, 2000) suggests that the reasons regulating behavior can serve as *rationales* as to "why putting forth effort during the activity might be a useful thing to do" (Reeve, Jang, Hardre, & Omura, 2002, p. 185; Steingut et al., 2017).

According to organismic integration theory (Ryan & Deci, 2000; Vansteenkiste et al., 2010), such rationales can be positive (e.g., "family" or "money"), but still differ with respect to their motivational quality. In this regard, findings convincingly demonstrate that a rationales motivational quality determines its effect (e.g., Davis, Kelley, Kim, Tang, & Hicks, 2016; Kazén et al., 2015; Steingut et al., 2017; Sweeney & Freitas, 2017; see also chapter 3.1.3.2). Regarding this issue, meta-analytic findings on the effectiveness of rationale provision show that rationales, in general positively affect motivation-related outcomes and that the effects on subjective value, engagement and performance are larger when the focal activity is uninteresting; however, autonomous compared to controlling rationales have a larger effect on autonomous motivation, engagement, and performance (Steingut et al., 2017). Moreover,

engaging in an activity for autonomous reasons, relative to controlling reasons, is associated with greater well-being and sustained effort (Deci & Ryan, 2008; Koestner et al., 2008; Sheldon & Houser-Marko, 2001; Vansteenkiste et al., 2014) as well as with higher subjective vitality (Kazén et al., 2015; Martela et al., 2016).

Thus, findings based on self-determination theory strongly suggest that simply visualizing positive incentives is not necessarily sufficient with respect to outcomes associated with well-being and adaptive behavior (cf. Howard et al., 2017; Steingut et al., 2017). To be effective in instances of insufficient motivation, it requires to appraise the focal behavior in relation to personally meaningful (i.e., autonomous) rationales/motives. The following example illustrates this issue: Take, for instance, an employee who has extrinsic reasons for engaging in uninteresting task at work, because his supervisor demands it and he wants to avoid negative feedback. According to organismic integration theory, such controlling rationale would result in controlled/have-to motivation toward the task which is associated with detrimental outcomes; I have argued above that this can be considered as an instance of insufficient motivation (see chapter 3.1.4). According to the theory, if the employee tries to reappraise the situation by visualizing that his supervisor will be pleased and grant him a bonus (i.e., controlling rationale), this would increase his controlled/have-to motivation toward the focal task and undermine motivation-related outcomes. If, however, he reappraises the situation by visualizing that the bonus will allow him to go on vacation with his beloved family (i.e., autonomous rationale), this would increase autonomous motivation toward the task and facilitate more-distal positive outcomes. Research suggests, as long as autonomous rationales prevail in the given situation, outcomes are most likely positive (see Gillet et al., 2017; Howard et al., 2016).

In sum, when a person has to engage in a boring task at work, the implementation of positive reappraisal could help to deal with this instance of insufficient motivation. Self-determination theory (e.g., Ryan & Deci, 2000) suggests, however, that its effectiveness depends on the motivational quality of the reason which eventually motivates the behavior. Visualizing autonomous/high quality rationales (e.g., “I do this for my beloved family”) or controlling/low quality rationales (e.g., “I do this for the money”) has different consequences for the person’s experience and behavior toward the activity. Only when autonomous (vs. controlling) rationales for activity engagement are more salient and the activity is seen as instrumental for the achievement of personal goals, or the realization of values or fulfillment of needs, can positive reappraisal expected to be effective.

In order to understand how positive reappraisal can yield its effect in instances of insufficient motivation, however, it is necessary to unpack the underlying process and, thus, to identify activities and mechanisms involved.

3.3.3 Underlying Process

From a self-determination theory perspective, I propose that deploying positive reappraisal as a volitional cognitive change strategy refers to the cognitive activity of rethinking existing (rather controlling) rationales for activity engagement as well as self-generating autonomous rationales. As outlined above, the more the person who implements the strategy succeeds in self-generating autonomous rationales, the more the strategy should help to overcome insufficient motivation. In this regard, organismic integration theory (e.g., Ryan & Deci, 2000) suggests a mechanism for this effect: increased internalization of the focal behavior.

3.3.3.1 The Central Activity: Self-generating Autonomous Rationales

Rationales can be either externally provided (e.g., Steingut et al., 2017), or self-generated (e.g., Canning & Harackiewicz, 2015); positive reappraisal as a volitional strategy involves the latter. Whereas numerous studies show that self-generating rationales, in general, can positively affect motivation-related outcomes (e.g., Harakiewicz & Priniski, 2018), I only found one correlational study (Green-Demers et al., 1998) and one experimental study (Kazén et al., 2015), which indicated positive effects of self-generated autonomous rationales on motivation-related outcomes.

Thus, the study of self-generated autonomous rationales appears to be a research desideratum in the field of research drawing on self-determination theory. In contrast, studies drawing on self-determination theory, typically examine the effectiveness of rationale provision on motivation-related outcomes (see for example Steingut et al., 2017). With regard to the effectiveness of self-generated rationales, Deci and Ryan (2008) have only mentioned in passing that “to think about the value of the behavior to oneself may facilitate identifying with and integrating the behaviour’s value and regulation” (p. 17). Similarly, Jang (2008) suggested “to explore students’ capacity to self-generate rationales” in future research; regarding this he stated that it is “an unanswered question whether student-generated rationales might be more motivationally productive than teachers’ externally supplied rationales” (p. 809). Regarding this issue Vansteenkiste et al. (2018) also speculated that “when students find little interest in an activity and, hence, activity engagement is more effortful, students may benefit from seeing the personal relevance and necessity of the activity” (p. 35).

Indeed, studies examining the effectiveness of self-generated rationales typically draw on expectancy-value theory (Eccles & Wigfield, 2002; see for example Canning & Harackiewicz, 2015, Hulleman et al., 2017). Here, researchers commonly use the term utility value intervention, whereas utility value relates to the question as to how an activity/a task helps to reach some desired end state and is associated with usefulness (Eccles & Wigfield,

2002). In related studies, instructions typically prompt participants to consider in what way, for example, learning course material could be useful with respect to their personal life. Research shows that these interventions have a positive impact on long-term academic outcomes such as subjective value, interest and persistence as well as performance (Canning & Harackiewicz, 2015; Harackiewicz, Canning, Tibbetts, Priniski, & Hyde, 2016; Hulleman et al., 2010; Hulleman & Harackiewicz, 2009). In their review regarding utility-value interventions, Harackiewicz and colleagues (2016) conclude that "the intervention works by changing how students think about course topics. […] The key is having students work to find the utility value for themselves" (p. 746).

Building on this, I expect that people can successfully self-generate rationales. Taking organismic integration theory into account, I additionally emphasize that in order for these rationales to be effective in instances of controlled motivation, they are required to be autonomous.

3.3.3.2 The Mechanism: Self-Deployed Internalization

In respect of the motivational mechanism underlying the effectiveness of positive reappraisal, organismic integration theory (Deci & Ryan, 1985; Vansteenkiste et al., 2010) provides an explanation: a shift on the internalization continuum in direction of more-autonomous motivation. From a process perspective, "[i]ntemalization represents the active assimilation of behavioral regulations that are originally alien or extemal to the self" (Ryan, 1995, p. 304). Furthermore, it "is critical for the self-initiation and maintenance of socially important, yet non-intrinsically motivated, behaviors" (Vansteenkiste et al., 2010, p. 113).

The internalization process typically unfolds naturally over time (Ryan & Deci, 2000; Vansteenkiste et al., 2010; Vansteenkiste et al., 2018) and/or through external influence (i.e., autonomy support Jang, 2008; Muraven et al., 2008; Reeve et al., 2002). However, this process can also be self-deployed, as Jang (2008, p. 809), Deci and Ryan (2008, p. 17) as well as Vansteenkiste et al. (2018, p. 35) have speculated.

In the current work, I propose that when people self-generate personally meaningful/autonomous rationales in instances of insufficient motivation, they initiate the internalization process. The more they connect the focal behavior to personally meaningful rationales – in other words, to something that matters to them (e.g., values or personally meaningful goals) or to someone who matters to them (e.g., family; Gore & Cross, 2006; Thibault Landry et al., 2016; Menges et al., 2017) – the more it becomes associated with the psychological needs for autonomy, competence or relatedness respectively, which energizes the behavior. Thus, when employees feel pressured to engage in a project they got assigned to, they could anticipate the bonus that is contingent on the project's outcome (i.e., controlling rationale) or visualize what they can learn for their career from working on this project (i.e.,

autonomous rationale); the latter rationale, in contrast to the former, should foster internalization and can therefore be expected to be more adaptive.

To summarize, I argue that self-generating autonomous rationales for engaging in an insufficiently motivated activity instigates a self-deployed internalization process which is positively associated with autonomous motivation and more-distal outcomes.

3.4 Resume and Proposition of a Self-Determination Theory-Based Framework of Positive Reappraisal

While positive reappraisal has proven to be an effective emotion-regulation strategy (e.g., Folkman & Moskowitz, 2000; Shiota & Levenson, 2012), a thorough examination in the context of motivation and volition has not been accomplished thus far. Moreover, whereas there are findings from different streams in motivation and self-regulation literature which are consistent with the notion that positive reappraisal can promote motivation-related outcomes (e.g., Canning & Harackiewicz, 2015; Kazén et al., 2015; Schwinger et al., 2009), a conceptualization as a volitional strategy is still lacking. The current work addresses these gaps.

I define positive reappraisal as a volitional strategy as the process of deliberately discovering and visualizing additional positive incentives for engaging in an otherwise insufficiently motivated behavior. Consequently, I assign it to cognitive change strategies (Duckworth et al., 2014), and, more specifically, to motivation control strategies (e.g., Hennecke & Bürgler, 2020; Kehr & v. Rosenstiel, 2006). Importantly, however, I argue by drawing on self-determination theory (e.g., Ryan & Deci, 2000) that the strategy's effectiveness depends on the motivation quality of the motive which corresponds to the positive incentive visualized. More specifically, in terms of self-determination theory, visualizing positive incentives can refer to self-generating either autonomous or controlling rationales, but self-generating autonomous (i.e., high motivation quality) compared to controlling (i.e., low motivation quality) rationales is expected to be more-adaptive in instances of controlled motivation. Accordingly, I propose that, in terms of self-determination theory, effectively deploying positive reappraisal in instances of insufficient motivation refers to the process of rethinking existing (controlling) rationales for activity engagement and additionally self-generating autonomous rationales. This is the case, for example, when people reappraise the focal activity as a means either to satisfy psychological needs ("If I pass this last exam in my master's degree, then I can live self-determined and finally found a start-up."), realize personal values ("The activity requires self-discipline, and it is important for me to show this") and/or make progress towards goals ("The activity helps me to train my concentration which will help me to pass my driving test; when I have my driver's license, I can live more autonomous.").

In the following research, this self-determination theory-based definition will serve as my operational definition. When positive reappraisal involves the self-generation of autonomous rationales, I expect it to be a potent strategy that supports the pursuit of need-discrepant goals. However, self-generating autonomous rationales can be expected to be effective in instances of controlled motivation only when autonomous rationales dominate controlling rationales. The

effectiveness on more-distal, affective, cognitive and behavioral outcomes should increase as a function of the autonomous rationale's strength (i.e., high motivation quality and quantity).

To my knowledge, the specific questions of the current research have not been tested empirically. As the examination of positive reappraisal as a volitional strategy in general, and of self-generated autonomous rationales in particular appears to be a research desideratum, I propose a *self-determination theory – based framework of positive reappraisal* (see Figure 2).

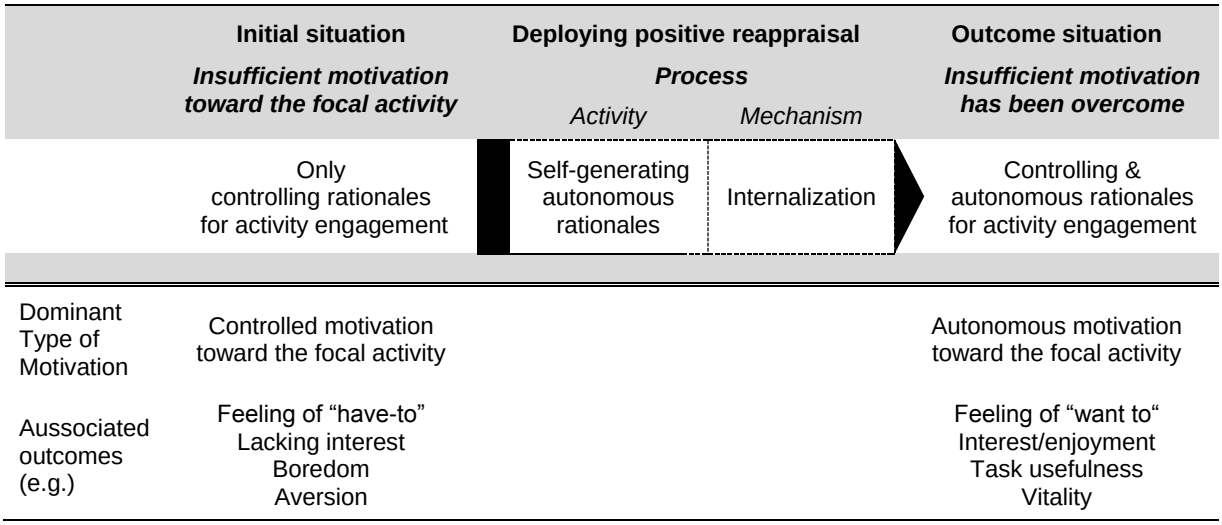

Figure 2. A self-determination theory – based framework of positive reappraisal.

The framework describes the motivational effect of positive reappraisal as a volitional strategy and its underlying process in terms of self-determination theory. It shows that self-generating autonomous rationales in instances of controlled motivation enhances autonomous motivation toward the focal activity/behavior. When, as a result, autonomous motivation toward the activity dominates controlled motivation, it has a positive impact on affective, cognitive, and behavioral outcomes associated with autonomous motivation.

From the discussion above, I derive the following proposition:

> Proposition 1: In an instance of insufficient motivation, self-generating autonomous rationales (i.e., positive reappraisal) enhances autonomous motivation toward the focal activity. This effect should increase as a function of the autonomous rationale's strength (i.e., high motivation quality and quantity).

Furthermore, I argue that the effectiveness of self-generating autonomous rationales in instances of insufficient motivation can be explained by a self-deployed internalization process. Thus, internalization (Deci & Ryan, 2000; Ryan, 1995; Vansteenkiste et al., 2018) serves as a mechanism that explains how positive reappraisal as a volitional strategy yields its proposed motivation-related effects (see Ryan & Deci, 2000; Su & Reeve, 2011; Vansteenkiste et al., 2018). Accordingly, my second proposition reads as follows:

> Proposition 2: In an instance of insufficient motivation, self-generating autonomous rationales toward the focal activity (i.e., positive reappraisal) fosters the process of internalization.

4 Present Research

My research agenda refers to the operational definition of positive reappraisal as a volitional cognitive change strategy and, thus, focuses on the motivation-related short-term effects of self-generated autonomous rationales in instances of insufficient motivation. Consequently, in my experimental studies I systematically (1) induced insufficient motivation toward the focal activity and (2) manipulated whether or not participants self-generated autonomous rationales. More precisely, in order to create instances of insufficient motivation, I induced controlled motivation on the participants who had to work on uninteresting, rather aversive tasks (cf. Deci et al., 1994) in four experimental studies; thereafter, I asked them to self-generate autonomous rationales for engaging in the focal task. The instruction to self-generate autonomous rationales was designed to prompt participants to change their appraisals of the focal activity and was expected to positively influence motivation-related and self-regulatory outcomes (cf. chapters 3.3.2.1 and 3.3.2.2.). In a fifth study, in order to extend the results of the experimental studies and to test their ecological validity, I conducted a field study using the experience sampling method (Csikszentmihalyi & Larson, 1987). In contrast to the lab studies, I asked participants to think about aversive activities lying ahead; furthermore, instead of assessing the degree of autonomous motivation toward the task as an indicator of internalization, I assessed the motivational quality of self-generated rationales. In each study, the logic underlying my predictions with regard to how positive reappraisal should help in overcoming insufficient motivation remained the same: When people self-generate autonomous rationales in instances of insufficient motivation (i.e., controlled motivation toward a boring/aversive task) and, thereby, successfully connect the focal activity to an autonomous rationale, it facilitates autonomous motivation toward the task and, thus, leads to adaptive outcomes.

The present research aims to facilitate conceptual clarity and extends previous results by contributing where related studies were deficient: In contrast to previous research drawing on self-determination theory (Ryan & Deci, 2000) focusing on rationale provision (see Steingut et al., 2017), I focus on the effectiveness of self-generating rationales; in contrast to previous research drawing on expectancy-value theory (Eccles & Wigfield, 2002) focusing on long-term effects of utility value interventions (e.g., Canning & Harackiewicz, 2015), I focus on situational effects, control for insufficient motivation and consider motivational quality of rationales (cf. Steingut et al., 2017).

In the following I present five studies: four lab experiments and a quasi-experimental field study (Study 5). Study 2 and Study 3 are attempts to replicate the findings from Study 1. Study 3 and Study 5 were preregistered (Study 3: https://aspredicted.org/55ii3.pdf; Study 5: https://osf.io/dsz4f).

4.1 Study 1: Motivational and Self-Regulatory Effects of Receiving and Self-Generating Rationales for Engaging in an Uninteresting Task

4.1.1 Introduction

Insufficient motivation is a widespread phenomenon and is particularly present in the work context (Gallup, 2023) as well as in the academic context (Heublein et al., 2017). At work, employees often have to deal with, for instance, tedious work assignments or subjectively meaningless tasks (e.g., van Hooff & van Hooft, 2016); at universities, students are often challenged to deal with subjectively uninteresting or unimportant course material. However, in order to achieve their goals (e.g., receiving a promotion or graduating), employees and students alike need to deal with such instances of insufficient motivation and learn how to overcome them.

Regarding this issue, previous studies drawing on self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) demonstrate that providing employees rationales for engaging in – even boring - tasks can facilitate motivation (Steingut et al., 2017; Slemp et al., 2018). Similarly, research shows that self-generating rationales can also have positive effects on motivation-related outcomes (e.g., Canning et al., 2015; Hulleman et al., 2010; Hulleman et al., 2017). Interestingly, however, these two streams of research have developed largely independently of each other thus far (see as an exception Green-Demers et al., 1998).

The present study examines both sources of rationales in combination. More importantly, however, to my knowledge this is the first study that also systematically takes the motivational quality of self-generated rationales into account. The purpose of this study is twofold: First, I aim to replicate findings demonstrating detrimental effects of providing controlling/low quality compared to autonomous/high-quality rationales for engaging in a boring task. Second, my primary interest is to examine as to whether self-generating autonomous rationales in addition to receiving controlling rationales can counteract detrimental effects of the latter. To that end, in the following I will scrutinize the effectiveness of rationales on the dimensions of source (provided vs. self-generated) and type (autonomous vs. controlling) in more details. Thereafter, I will specify, precisely, as to why I expect that considering a rationale's motivational quality is crucial with regard to outcomes in the focal as well as in a subsequent activity.

4.1.1.1 Sources of Rationales and Motivational and Self-Regulatory Outcomes

Rationales refer to the reasons that tell people "why putting forth effort during the activity might be a useful thing to do" (Reeve et al., 2002, p. 185). In other words, they serve as the subjective "why" for a person's behavior and, as such, regulate the behavior (Ryan & Deci, 2000). With regard to a rationale's source, researchers distinguish directly communicated or

externally provided (e.g., Steingut et al., 2017) and self-generated rationales (e.g., Canning & Harackiewicz, 2015). Typically, studies drawing on self-determination theory (Deci & Ryan, 2000) focus on the effect of externally provided rationales on motivation-related outcomes (Jang, 2008; Slemp et al., 2018; Steingut et al., 2017). In this regard, meta-analytic findings suggest that rationale provision, in general, has positive effects on subjective value, motivation, engagement and performance; furthermore, it suggests that rationale provision is more effective with regard to uninteresting than to interesting tasks (Steingut et al., 2017).

Unlike research drawing on self-determination theory, research drawing on expectancy-value theory (Eccles & Wigfield, 2002) analyzes long-term effects of self-generated rationales with a focus on outcomes such as interest or achievement (e.g., Hulleman et al., 2009; Hulleman et al., 2017). In related studies, researchers typically prompt students to identify and to write down meaningful connections between, for example, course material and their personal life; this approach is termed utility value intervention. Expectancy-value theory suggests that a person's motivation toward an activity is determined by her confidence to master the activity as well as her value perceptions toward it (Eccles & Wigfield, 2002). In support of this, findings show that utility value interventions have a positive impact on subjective value and interest (e.g., Canning & Harackiewicz, 2015; Hulleman et al., 2010), as well as on performance (Canning & Harackiewicz, 2015; Hulleman et al., 2017). Moreover, self-generating utility value has been shown to be helpful specifically for people who do not expect to perform well in a given task (e.g., Hulleman et al., 2010).

However, until now, very few studies have analyzed both sources of rationales in combination (e.g., Canning & Harackiewicz, 2015). Canning and Harackiewicz (2015), for example, examined the effectiveness of rationale provision as well as of self-generating rationales for using a novel multiplication technique of unspecified interest-level. In one study (Study 2), they provided utility information with regard to how the technique could be useful in the participants' life (i.e., rationale provision) and instructed participants to self-generate utility value with regard to the technique. They found that in contrast to simply providing a rationale, which undermined performance compared to self-generating a rationale (Study 1), a combination of both resulted in a positive effect on perceived utility value, interest and performance, especially for participants with low confidence to be able to perform the task.

However, regarding a rationale's effectiveness, self-determination theory (Ryan & Deci, 2000) strongly suggests taking different types of rationales into account that differ in terms of their motivational quality.

4.1.1.2 Types of Rationales and Motivational and Self-Regulatory Outcomes

Converging evidence from studies drawing on self-determination theory demonstrate that a rationale's motivational quality strongly influences its effect (Steingut et al., 2017);

typically researchers distinguish two types of rationales, controlling and autonomous. Controlling rationales relate to feelings of pressure, perceiving activity engagement as an obligation or orienting behavior on the provision of external rewards or anticipated punishments. Behavior regulated by controlling rationales leads to controlled motivation which is largely seen as a low-quality motivation, because it is associated with rather low levels of well-being as well as with somewhat poorer performance (e.g. Nix et al., 1999; Sheldon & Elliot, 1998; Vansteenkiste et al., 2014). Behavior regulated by autonomous rationales, in contrast, is associated with autonomous motivation, which is largely seen as high-quality motivation, because it leads to desirable outcomes such as high levels of well-being and good performance (Howard et al., 2016; Trépanier et al., 2015; Vansteenkiste et al., 2009). Moreover, previous research suggests that controlling rationales are detrimental to outcomes, in particular when autonomous rationales are absent (cf. Howard et al., 2016). Self-determination theory proposes that autonomous rationales, in contrast to controlling rationales, correspond to higher degrees of internalization. This, however, is accompanied by the energizing satisfaction of the fundamental need for autonomy (Ryan & Deci, 2000; Sheldon & Elliot, 1998; Vansteenkiste et al., 2018). Accordingly, research shows when people have autonomous, relative to controlling rationales, for engaging in an activity, it is positively associated with subjective value (e.g., Jang, 2008; Steingut et al., 2017), interest and enjoyment toward it (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Deci, 2006), the willingness to invest effort (e.g., Sheldon & Elliot, 1998; Vasalampi et al., 2014), subjective vitality (see Martela et al., 2016; Nix et al., 1999); moreover, it is negatively associated self-regulatory failure in subsequent activities (e.g., Moller, Deci, & Ryan, 2006; Muraven et al., 2008; Ryan & Deci, 2008). Furthermore, meta-analytic findings demonstrate that autonomous relative to controlling rationales have a larger effect on autonomous motivation, engagement, and performance (Steingut et al., 2017).

In numerous studies, researchers have gone beyond providing autonomous rationales only and have also provided autonomy support. Providing autonomy support, however, encompasses practices such as acknowledgment of negative affect and the use of non-controlling language in addition to providing personally meaningful rationales (see Deci et al., 1994; Steingut et al., 2017; see Reeve, 2009; or Su & Reeve, 2011 for a review of autonomy supportive practices and its positive consequences). Research shows that these practices have synergistic effects (see Steingut et al., 2017): Autonomy support is, for example, positively correlated with autonomous motivation (e.g., Reeve & Jang, 2006; Slemp et al., 2018) and well-being (Slemp et al., 2018) as well as with engagement (see Reeve, 2012; Slemp et al., 2018).

4.1.1.3 Rationales and Motivational and Self-Regulatory Outcomes in Subsequent Activities

Findings from previous studies suggest that rationales can affect motivational and self-regulatory outcomes even with regard to subsequent activities (e.g., Muraven et al., 2008). There is extensive research that has examined the phenomenon of self-regulatory failure subsequent to performing another task (for a review see for example Carnevale & Fujita, 2016). It is reasonable to assume, however, that the benefits of providing autonomous rationales in an autonomy supportive manner persist beyond the focal activity (see Martela et al., 2016).

The observed carry over effect from one task to another can be broadly described as a "diminished capacity or willingness to regulate thoughts, feelings, and behavior following some initial act" (Carnevale & Fujita, 2016, p 95). In the current study, I invoke motivational explanations (cf., Beedie & Lane, 2012; Inzlicht, Berkman, & Elkins-Brown, 2016; Inzlicht, Legault, & Teper, 2014; Ryan & Deci, 2000) for this carryover effect.[12] Regarding this issue, converging evidence suggests that self-regulatory failure in a subsequent activity "can be countered by […] additional sources of value" (Inzlicht et al., 2016, p. 112; see also Francis & Inzlicht, 2016; Molden, Hui, & Scholer, 2016). Accordingly, by drawing on self-determination theory (e.g., Ryan & Deci, 2008), I assume that the willingness to regulate behavior or, in other words, to exert mental effort in a subsequent activity drops in particular when controlling rationales had regulated the behavior toward the foregone activity (see also Inzlicht et al., 2014; Müller & Apps, 2018). Regarding this, research drawing on self-determination theory shows that receiving autonomy support for engaging in an activity tends to sustain self-regulation in subsequent, seemingly unrelated, activities; in contrast, receiving controlling rationales, however, appears to increase the likelihood to make self-regulatory failure in subsequent activities (Muraven, 2008; Muraven et al., 2008; Muraven, Rosman, & Gagné, 2007; Muraven & Slessareva, 2003). Moreover, research shows that having autonomous rationales relative to controlling rationales for engaging in a behavior is associated with perceiving fewer obstacles and greater ease (Werner & Milyavskaya, 2016) , greater vitality (Kazén et al., 2015; Martela et al., 2016; Muraven et al., 2008), as well as with more

[12] The phenomenon of self-regulatory failure subsequent to performing another task has been frequently studied under the term "ego depletion" (for reviews see Francis & Inzlicht, 2016; Inzlicht & Friese, 2019). The term ego depletion is, however, rather misleading and the premises of the paradigm researchers used to examine ego depletion has been subject of heated debates for almost a decade (Carnevale & Fujita, 2016; Friese, Loschelder, Gieseler, Frankenbach, & Inzlicht, 2018; Inzlicht & Berkman, 2015). More specifically, converging evidence suggests that the premises underlying ego depletion drawing on a resource model of self-control (Baumeister et al., 1998) are not tenable. A multilab preregistered replication study finally revealed no effect (Hagger et al., 2016), concluding the debate regarding the premises underlying ego depletion; moreover, these findings cast reasonable doubt on whether this effect exists at all. When I conducted the current Study in 2016, however, the criticized resource model of self-control (Baumeister et al., 1998) did not inform my predictions, but motivational explanations did (e.g., Inzlicht et al., 2014; Inzlicht et al., 2016; Martela et al., 2016; Ryan & Deci, 2000, 2008). Moreover, as Inzlicht and Friese (2019) strongly recommended with regard to the research paradigm in question, I conducted (preregistered) replication studies (see Study 2 and Study 3).

persistence (Deci et al., 1994; Jang, 2008); furthermore, ongoing research provides some preliminary evidence that increasing interest enhances the willingness to exert effort and reduces the experience of fatigue (Milyavskaya, Galla, Inzlicht, & Duckworth, 2021).[13] Thus, I expect that the willingness to regulate behavior should be maintained as long as personally meaningful/self-relevant/autonomous rationales toward the foregone activity prevail.

4.1.1.4 The Current Research

I conducted three consecutive experimental studies, whereby Study 2 and 3 focused on replicating and extending the observed motivational and self-regulatory effects of the original study (Study 1). Study 3 was furthermore pre-registered and conducted in a different lab.

Based on this previously discussed research, I tested several hypotheses. With regard to my first hypothesis, I attempt to replicate previous findings showing that receiving autonomy support, relative to controlling rationales, has positive effects with regard to the initial as well as to a subsequent task (e.g., Moller et al., 2006; Muraven et al., 2008). More specifically, I expect that receiving autonomy support, relative to controlling rationales, positively affects value perceptions toward the uninteresting activity (Jang, 2008; Reeve et al., 2002), enhances interest and enjoyment (Deci & Ryan, 2000; Gagné & Deci, 2005; Ryan & Deci, 2006) and facilitates self-regulation in the focal activity (see Legault & Inzlicht, 2013; Slemp et al., 2018; Steingut et al., 2017) as well as in a subsequent activity (e.g., Inzlicht et al., 2014; Inzlicht et al., 2016; Molden et al., 2016; Muraven et al., 2008). Therefore, my first hypothesis reads as follows:

(Confirmatory) Hypothesis 1a: People who receive autonomy support for engaging in an uninteresting activity report higher value/usefulness perceptions as well as more interest/ enjoyment and show better self-regulatory performance, compared to people who receive controlling rationales.

Empirical findings (e.g., Muraven et al., 2008) as well as theoretical considerations (Inzlicht et al., 2014) support the prediction that autonomy support for engaging in an uninteresting task should sustain self-regulation in a subsequent task.

[13] This expectation is also supported by the energy conservation principle (cf. Gendolla & Richter, 2010; Silvestrini & Gendolla, 2013), which states that people are generally motivated to conserve effort and, moreover, expand only as much effort as necessary and subjectively worthwhile.

(Confirmatory) Hypothesis 1b: People who receive autonomy support for engaging in an uninteresting activity show better self-regulatory performance in a subsequent task, compared to people who receive controlling rationales.

Previous research demonstrates that self-generating rationales can lead to positive motivational and self-regulatory outcomes, too (e.g., Canning & Harackiewicz, 2015; Hulleman et al., 2010; Leroy, Grégoire, Magen, Gross, & Mikolajczak, 2012; Muraven & Slessareva, 2003). Moreover, findings suggest a positive effect resulting from the combination of providing and self-generating rationales for engaging in a task (e.g., Canning & Haraciewicz, 2015). Regarding this issue, I additionally take the rationales' motivational quality into account, as suggested by self-determination theory (Ryan & Deci, 2000); more precisely, I aim to test whether self-generating autonomous rationales can counteract detrimental effects of controlling rationales. I expect that self-generating autonomous rationales for engaging in an uninteresting task should facilitate the internalization of the focal activity (e.g., Vansteenkiste et al., 2018) and, therefore, lead to positive, adaptive outcomes with regard to the initial as well as to the subsequent activity (e.g., Inzlicht et al., 2014; Martela et al., 2016; Molden et al., 2016). Thus, my second hypothesis reads as follows:

Hypothesis 2a: After having received controlling rationales for engaging in an uninteresting task, people who additionally self-generate autonomous rationales report higher value/ usefulness perceptions as well as more interest/ enjoyment and show better self-regulatory performance, compared to people who additionally describe irrelevant aspects of the task.

Hypothesis 2b: After having received controlling rationales for engaging in an uninteresting task, people who additionally self-generate autonomous rationales show better self-regulatory performance in a subsequent task, compared to people who additionally describe irrelevant aspects of the task.

Lastly, I expect that self-generating autonomous rationales in addition to receiving autonomy support, also leads to more-positive and more-adaptive outcomes, compared to receiving controlling rationales only.

Hypothesis 3a: People who receive autonomy support for engaging in an uninteresting task, and additionally self-generate autonomous rationales, report higher value/ usefulness perceptions as well as more interest/ enjoyment and show better self-regulatory performance, compared to people who receive controlling rationales.

Hypothesis 3b: People who receive autonomy support for engaging in an uninteresting task, and additionally self-generate autonomous rationales, show better self-regulatory performance in a subsequent task, compared to people who receive controlling rationales.

The main purpose of this study is to examine the effects of self-generating autonomous rationales for a boring task in addition to receiving controlling rationales. I use an uninteresting task and take different types of rationales into account. Moreover, I control for subjective task difficulty, by using a boring vigilance task, which is very easy to perform.

4.1.2 Method

4.1.2.1 Participants.

Participants were 204 students from the Technical University of Munich who participated in exchange for course credit (mean age = 23.09, SD = 2.87; range 19–34; 69 female, 135 male). Roughly 90% of participants indicated German as their mother tongue. Students carried out tasks and self-reports at computers in the lab. The experiment was embedded in a series of studies and took approximately 30 minutes to complete. Application of criteria for post-data collection exclusion of participants, described in the Data Diagnostic section below, resulted in a total of 179 participants for which I could conduct further analysis.

4.1.2.2 Procedure.

Participants were randomly assigned to one of four conditions in a 2 (receiving autonomy support vs. receiving controlling rationales) x 2 (self-generating autonomous rationales vs. answering irrelevant questions) factorial design. Half of the participants received an autonomous rational for engaging in the initial task in combination with autonomy supportive practices (i.e., autonomy support), whereas the other half received a controlling rationale (cf. Deci et al., 1994). Autonomy support/controlling rationales referred to the computerized version of the Mackworth Clock vigilance task (Lichstein, Riedel, & Richman, 2000). This task was selected on the basis of three characteristics: First, vigilance tasks typically have a low interest-level and are perceived as boring by most people (e.g., Cummings, Gao, & Thornburg, 2016; See, Howe, Warm, & Dember, 1995; Warm, Parasuraman, & Matthews, 2008); therefore, the motivational experience toward the vigilance task should be sensitive to self-generated or provided rationales respectively (see Deci et al., 1994; Steingut et al., 2017). Second, the vigilance task is fairly easy to perform; thus, I chose this task to control for confidence in mastering the task which typically influences motivation-related outcomes (see

Canning & Harackiewicz, 2015). Third, as the vigilance task “involves focused attention, it easily lent itself to the believable rationale that it could be useful for improving concentration” (Deci et al. 1994, p. 127), which is conducive for providing as well as self-generating a rationale.

Before participants started the trial period of the Mackworth clock vigilance task, they (1) were introduced to the task in a 1-minute practice period (with 3 targets). Following the practice trials and prior to the actual trials, I manipulated between participants, whether they received autonomy support or controlling rationales, and whether they were instructed to self-generate autonomous rationales or to answer irrelevant questions. With regard to providing autonomy support, I oriented instructions on Deci et al. (1994). Consequently, (1) participants were provided with an autonomous rationale for engaging in the activity; additionally (2) I validated their own perspective by acknowledging their possible disinterest in the task and (3) I avoided controlling language (Deci et al., 1994; see also Jang, 2008; Reeve et al., 2002; Reeve, Ryan, Deci, & Jang, 2007; Su & Reeve, 2011). Thus, half of the participants received autonomy support in the following way (i.e., receiving autonomous rationales communicated in an autonomy-supportive way: RAS):

> Thank you, this was the practice round. Please perform the following task and evaluate it thereafter. Please press the space-bar as quickly as possible when the red dot skips a target position. Some people enjoy doing this task, others don't. Some people find this task interesting, others don't. Therefore, we completely understand if you find this task to be tedious. It has been shown that there are benefits to performing this task. This type of task trains vigilance (a state of sustained attention). This type of task is used globally by students, athletes and even astronauts in order to improve vigilance.
> As soon as you are ready to proceed, you may click “continue” at your leisure.

To provide controlling rationales, I used controlling language when instructing the task (Deci et al., 1994) and emphasized on the course credits as a reward for performing the task (see Lee, Chatzisarantis, & Hagger, 2016). Thus, this half of the participants received the following controlling rationale (i.e., receiving controlling rationales: RCR):

> This was the practice round. This is the first task that you are required to carry out and subsequently evaluate. You have to press the space-bar as quickly as possible when the red dot skips a target position. You will need to carry out the task for several minutes. You will be notified when the task has come to an end. For motivation: when you have completed and evaluated the following tasks, you will

receive a participation confirmation and course credits. Now proceed by clicking “continue“.

I expected that receiving autonomy support relative to controlling rationales would be associated with greater value/usefulness perceptions (Deci et al., 1994) and higher interest/enjoyment toward the vigilance task as an indicator of autonomous motivation (Steingut et al., 2017) and deteriorate self-regulatory success (i.e. performance) in the focal as well as in the subsequent task (e.g., Moller et al., 2006; Muraven, 2008; Muraven et al., 2008; Muraven et al., 2007).

After receiving rationales, participants either had to answer irrelevant questions, or they were instructed to additionally self-generate autonomous rationales. With respect to the irrelevant questions, I asked participants to take three minutes to write down what they remembered about the structure of the vigilance task (i.e., answering irrelevant questions: AIQ). This time span paralleled the time I gave the other group of participants to self-generate autonomous rationales. Here, I encouraged participants to consider why performing the vigilance task could be personally meaningful to them. Participants were prompted to self-generate autonomous rationales with the following instruction (i.e., self-generating autonomous rationales: SGAR):

> Before you begin the task, spend about 3 minutes on the following (timer will be shown at the top left of the screen): Think back to the task. Now try to see this task in a positive light and try to see the benefits of carrying out the task. To what extent could you benefit from such types of tasks? How could you personally benefit from carrying out this specific task? Write your thoughts and answers to these questions as detailed as possible in the text box below.

As a consequence of this procedure, participants got randomly assigned to one out of four conditions: (1) receiving controlling rationales & answering irrelevant questions (RCR + AIQ), (2) receiving autonomy support & answering irrelevant questions (RAS + AIQ), (3) receiving controlling rationales & self-generating autonomous rationales (RCR + SGAR), (4) receiving autonomy support & self-generating autonomous rationales (RAS + SGAR).

Next, participants started the trial period; they worked for 12 minutes on the vigilance task in which the maximum number of targets was 30 (cf. Muraven et al., 2008, Experiment 1). During the vigilance task, specifically after 3 minutes, I assessed task-related value/ usefulness as an indicator for the extent to which the boring vigilance task had been given some

importance (Legault & Inzlicht, 2013).[14] In order to maintain the saliency of self-generated rationales during task engagement, I subsequently asked all participants how well they remembered what they had written before the trial period. After task completion, participants reported their feelings of interest/enjoyment toward the task, which is another constituent feature of autonomous motivation (Deci et al., 1994; Legault & Inzlicht, 2013). Significantly stronger feelings of interest/enjoyment toward the vigilance task in conditions where participants received and/or self-generated autonomous rationales relative to the condition where participants received controlling rationales only, indicate successful manipulations (Deci et al., 1994; Legault & Inzlicht, 2013). More specifically, as vigilance tasks have a low-interest level and are associated with mental effort due to the regulation of task-irrelevant thoughts or feelings like boredom (e.g., See et al., 1995; Warm et al., 2008), I expected that, in contrast to receiving controlling rationales only, receiving autonomy support as well as self-generating autonomous rationales in addition to receiving controlling rationales / in addition to autonomy support would be associated with enhanced autonomous motivation and, therefore, maintain or even enhance the willingness to invest effort in the subsequent task. As a subsequent task, participants worked on a computer-based Stroop task, a standard measure to assess self-regulatory performance (Inzlicht & Gutsell, 2007; Job, Dweck, & Walton, 2010; Job, Walton, Bernecker, & Dweck, 2013; Legault & Inzlicht, 2013). Finally, participants reported their feelings of interest/ enjoyment regarding the Stroop task and were debriefed and thanked.

4.1.2.3 Measures.

Value/usefulness (vigilance task). I assessed task-related value/usefulness as a constituent feature of autonomous motivation (cf. Legault & Inzlicht, 2013; Ryan, 1982). For this purpose, I interrupted all participants after three minutes while they were working on the initial task and told them that I would like to "assess the experience in the moment". I adapted two items from the value/usefulness subscale of the Intrinsic Motivation Inventory (IMI; e.g., Ryan, 1982; "I believe working on this task is beneficial to me", "I think it is important that I work on this task").[15] Participants responded on a 7-point scale ranging from 1 (*I don't agree at all*) to 7 (*I totally agree*).

Self-regulatory performance (vigilance task). In a computerized version of the Mackworth Clock vigilance task (Lichstein et al., 2000) participants had to concentrate on a red dot that jumps clockwise from one position to another arranged in a circle. On a random basis, the red dot skipped a position. Participants were instructed to detect and report this kind

[14] Additionally, for exploratory reasons, I asked participants to report subjective success importance and momentary affect. There were no differences between groups on these variables. In the following, these variables will not be discussed further.
[15] All items used in the present work were translated into German by a native speaker.

of event by pressing the space-bar (i.e., hit); greater numbers of correct hits indicated better self-regulatory performance.

Interest/enjoyment (vigilance task). After completing the vigilance task, participants answered the seven-item interest/enjoyment subscale of the Intrinsic Motivation Inventory (IMI; e.g., Ryan, 1982)[16], another constituent feature of autonomous motivation (see Deci et al., 1994; Legault & Inzlicht, 2013; Muraven et al., 2007; Muraven et al., 2008). Sample items include "I enjoyed doing this activity very much", and "I would describe this activity as very interesting". Interest/enjoyment ratings ranged from 1 (*not at all true*) to 7 (*very true*).

Subsequent self-regulatory performance (Stroop task). In a computer-based version of the Stroop task, I asked participants to identify the color of a word's font (red, green, blue or black) when the word itself referred either to a congruent (24 trials) or to an incongruent color (24 trials, e.g., the word "red" in green font). I instructed participants to identify as quickly as possible the font color. When the word-color combination is incongruent, participants are conflicted between naming the color of a word and reading the word. Thus, in the Stroop task, participants must inhibit the response associated with the (interfering) word meaning in order to achieve the goal to name the correct font color which is difficult (cf. Legault & Inzlicht, 2013). As a measure of self-regulatory success in the Stroop task, I examined the difference in reaction time between correctly detected congruent and incongruent trials. This measure is commonly referred to as Stroop interference (reaction time to incongruent trials – reaction time to congruent trials; see Job et al., 2013; Kazén & Kuhl, 2005).

Interest/enjoyment with regard to the Stroop task. To assess participants' feelings of autonomous motivation toward the subsequent Stroop task, they completed the seven-item interest/enjoyment subscale of the Intrinsic Motivation Inventory (IMI; e.g., Ryan, 1982) after the Stroop task (see Deci et al., 1994; Legault & Inzlicht, 2013; Experiment 3, Muraven et al., 2007; Experiment 2 Muraven et al., 2008). Sample items included "I enjoyed doing this activity very much", and "I would describe this activity as very interesting". Interest/enjoyment ratings ranged from 1 (*not at all true*) to 7 (*very true*).

4.1.2.4 Data diagnostics.

Eight participants showed signs of noncompliance with regard to the instruction to self-generate autonomous rationales and were, therefore, excluded from analysis.[17]

[16] Intrinsic motivation and autonomous motivation lie on a continuum and are, therefore, phenomenologically at some point indistinguishable (see for example Ryan & Deci, 2020; Vansteenkiste et al., 2018). Thus, higher scores on the IMI are often interpreted as higher levels of extrinsic autonomous motivation (e.g., Legault & Inzlicht, 2013; Markland & Hardy, 1997; Muraven et al., 2008). In the current study, I apply this common practice.

[17] To give an example for a case where a participant did not follow the instruction to self-generate an autonomous rationale: „mit solchen Aufgaben will ich mich nicht beschäftigen, […]. – nix" (subject ID 2182).

Regarding the vigilance task, the frequency distribution of false presses (i.e., false alarms) was positively skewed: Most participants had no or few false presses, however, some participants had a very large number (cf. Giambra & Quilter, 1989). Regarding this, a common exclusion criterion is to remove participants with false alarm frequencies greater than two standard deviations above the mean (cf. Giambra & Quilter, 1989). In the current study, however, this exclusion criterion did not suffice, because several participants with a very large number of false alarms would have remained in the dataset after installing this criterion. These large numbers of false alarms suggest that some participants misunderstood the instruction and aimed at pressing the space -bar each time the red dot jumped from one position to the following, instead of – as instructed – pressing the space-bar as quickly as possible when the red dot skipped a position. For these participants, however, effort investment could have been affected by pressing the space-bar, and not by the experimentally induced type of motivation; this, however, would be problematic for testing H3a as well as H3b. Consequently, to control for effort investment in the initial task, I installed the following exclusion criterion: false alarm rate (F) less than 5% (for more on false alarm rates, see Stanislaw & Todorov, 1999). Here, the false alarm rate reflects the participant's general tendency to press the space-bar in instances when it was not intended. Thus, as there were 1107 trials with a maximum number of 30 correct hits and a maximum number of 1077 false alarms, participants with more than 54 false alarms were removed from the dataset.

As color-blindness is an exclusion criterion with regard to the Stroop task (cf. Job et al., 2013; Kazén & Kuhl, 2005), seven participants were removed from the dataset. In line with previous research using Stroop interference as a dependent variable (e.g., Job et al., 2013), I corrected Data on the trial level (i.e., outlying trials within each individual) and on the group level (i.e., outlying participants) by applying the following exclusion criteria: First, with regard to outlying trials, I removed responses faster than 300 ms from the dataset (cf. Jostmann & Koole, 2007; Kazén & Kuhl, 2005). Second, to exclude outlying participants from further analysis, I checked for participants who answered fewer than half of the incongruent trials correctly. As a consequence, nine more participants were excluded from analysis with regard to the variable Stroop interference.

4.1.3 Results

As a result of applying exclusion criteria, I could conduct the analyses for 179 participants (condition 1, RCR + AIQ: n = 51; condition 2, RAS + AIQ: n = 39; condition 3, RCR + SGAR: n = 50; condition 4, RAS + SGAR: n = 39).

The intercorrelations, means, standard deviations and Cronbach's α of the main measures can be seen in Table 3.

Table 3

Study 1: Intercorrelations, Means, Standard Deviations, and Chronbach's α

Variable	1.	2.	3.	4.	5.
1. Value/usefulness (vigilance task)	-				
2. Interest/enjoyment (vigilance task)	.51**	-			
3. Correct hits (performance vigilance task)	-.02	.18**	-		
4. Interest/enjoyment (Stroop task)	.26**	.28**	-.04	-	
5. Stroop interference (performance Stroop task)	-.01	-.01	.02	-.04	-
Mean	4.15	3.21	28.22	5.23	149.51
SD	1.88	1.15	2.77	.90	214.23
Cronbach's *α*	.75	.81		.74	

Note. Correlation analyses were conducted including only those participants for whom valid data were available (n = 179). Due to further Stroop task specific exclusion criteria described below, n = 170 for the variable Stroop interference.
*p < .05
**p< .01

4.1.3.1 Effects on Dependent Variables.

Value/usefulness of the vigilance task: There was a significant effect of condition on task-related value/usefulness, F(3, 175) = 3.522, p = .016, ω^2 = .041 (see Figure 3).[18] Planned contrasts (simple first) revealed that receiving autonomy support only (RAS + AIQ: M = 4.41, SD = 1.70) compared to receiving controlling rationales only (RCR + AIQ: M = 3.56, SD = 1.69) was associated with reporting more value/usefulness with regard to the vigilance task, t(81.832) = 2.361, p = .021, *r* = .19.[19] Similarly, self-generating autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 4.28, SD = 1.43), t(96.805) = 2.317, p = .023, *r* = .17) as well as self-generating autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 4.47, SD = 1.34) led to larger effects on value/ usefulness compared to receiving controlling rationales only (t(87.866) = 2.861, p = .005, *r* = .21).

[18] Effect size ω^2 is calculated based on Lakens (2013).
[19] Planned contrasts and effect size *r* are calculated based on Field (2018).

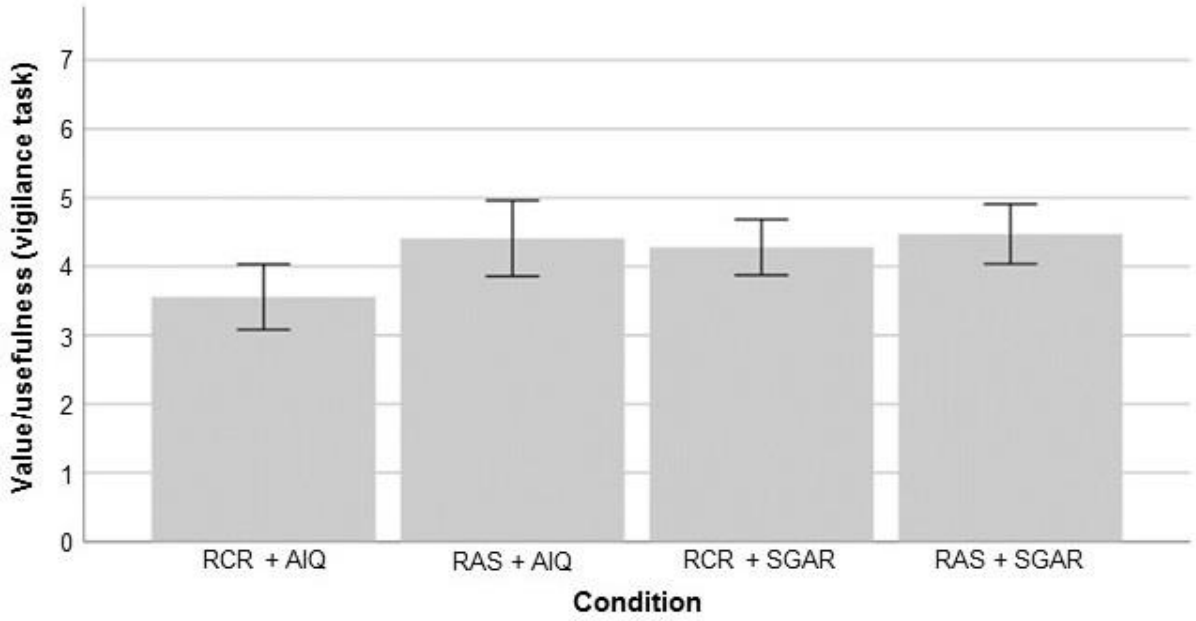

Figure 3. Results from Study 1: Mean values of value/usefulness (vigilance task) for each experimental condition.

Self-regulatory performance in the vigilance task: As the Levene's test was significant (p = .016), assumption of equality of variances was violated; thus, instead of conducting an ANOVA (and planned contrasts), I conducted the non-parametric Kruskal-Wallis test. Self-regulatory performance in the vigilance task was not significantly affected by condition H(3) = 4.810, p = .186. Multiple comparisons were not performed because the overall test did not show significance across conditions.

Interest/enjoyment toward the vigilance task: There was a significant effect of condition on interest/enjoyment toward the vigilance task, F(3, 175) = 4,473, p = .005, ω^2 = 0.055 (see Figure 4). Planned contrasts (simple first) revealed that receiving autonomy support only (RAS + AIQ: M = 3.49, SD = 1.20) increased interest/enjoyment compared to receiving controlling rationales only (RCR + AIQ: M = 2.74, SD = 1.02), t(74.519) = 3.152, p = .002, *r* = .23. Planned contrasts revealed furthermore that self-generating autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 3.33, SD = 1.14) increased interest/enjoyment compared to receiving controlling rationales only, t(97.252) = 2.738, p = .007, *r* = .20). Also, self-generating autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 3.41, SD = 1.13), compared to receiving controlling rationales only, increased interest/enjoyment, t(77.124) = 2.941, p = .004, *r* = .21).

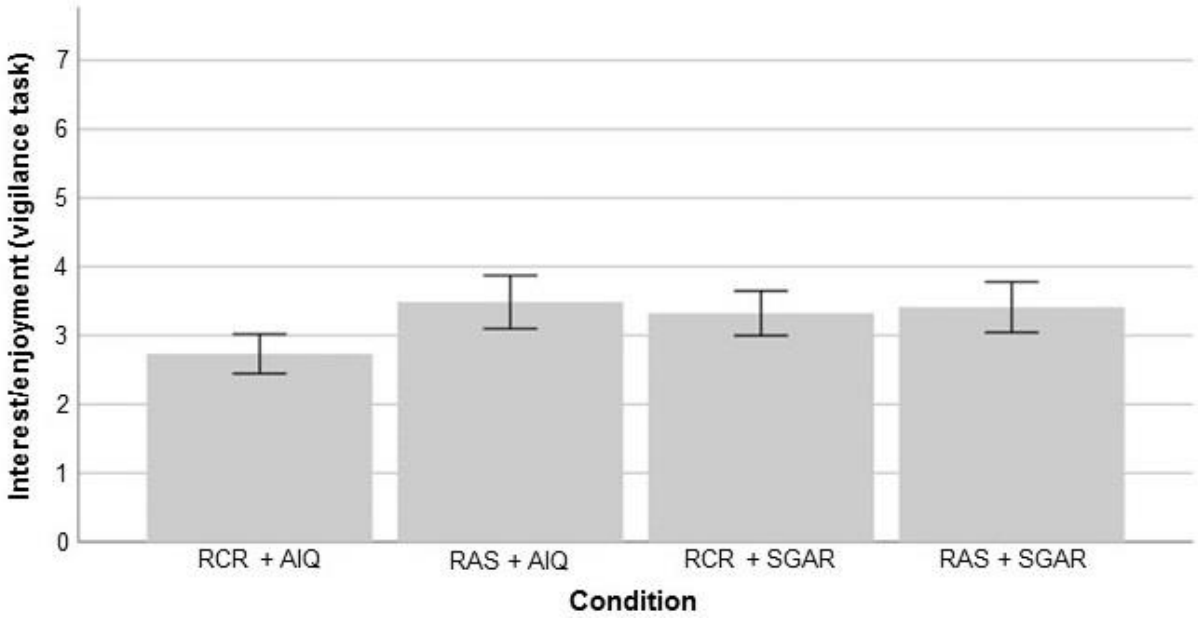

Figure 4. Results from Study 1: Mean values of interest/enjoyment (vigilance task) for each experimental condition.

Self-regulatory performance in the Stroop task: I operationalized self-regulatory performance in the subsequent Stroop task by measuring the degree of Stroop interference (cf. Job et al., 2013; Jostmann & Koole, 2007; Kazén & Kuhl, 2005); in this regard, less interference indicates a relatively better self-regulatory performance. I calculated Stroop interference by subtracting the mean reaction time for congruent trials from the mean reaction time for incongruent trials, whereas only reaction times for correct trials were included in the analysis. Overall, condition did not have a significant effect on Stroop interference, F(3, 166) = 2,272, p = .08, ω^2 = 0.022 (see Figure 5). Planned contrasts, however, revealed that self-generating autonomous rationales for engaging in the vigilance task on top of received controlling rationales (RCR + SGAR: M = 99.44, SD = 173.66) led to greater self-regulatory success compared to receiving controlling rationales only (RCR + AIQ: M = 195.21, SD = 271.28), t (86.023) = -2.091, p = .040, *r* = .17. In contrast, differences in Stroop interference were non-significant between receiving controlling rationales only and receiving autonomy support only (RAS + AIQ: M = 113.56, SD = 187.47, t(83.989) = -1.650, p = .103, *r* = .14) and self-generating autonomous rationales in addition to receiving autonomy support respectively (RAR + SGAR: M = 181.50, SD = 183.05, t(86.253) = -.277, p = .782, *r* = .02).

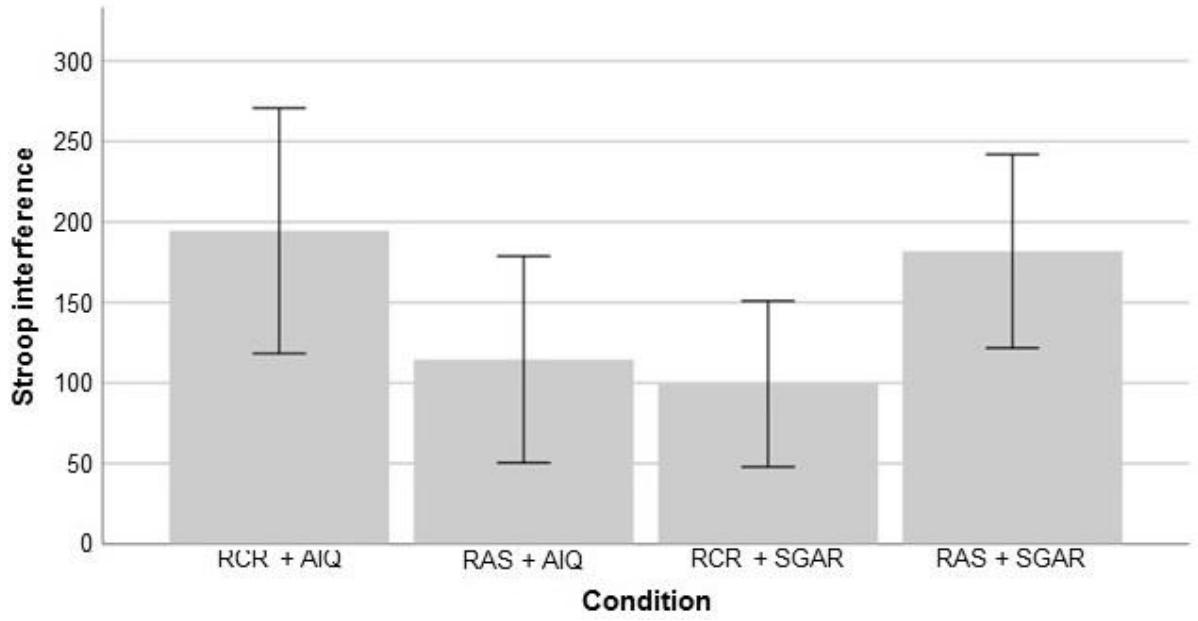

Figure 5. Results from Study 1: Mean values of Stroop interference (reaction time to incongruent trials – reaction time to congruent trials) in milliseconds for each experimental condition.

4.1.3.2 Exploratory analysis.

Whereas I predicted that the instructions would increase interest/enjoyment toward the initial task, I did not have any clear expectations regarding differences in interest/enjoyment toward the Stroop task; regarding this, findings from Muraven et al. (2008) suggest, however, that these measures would be unrelated. Nevertheless, in the present study, value/usefulness perceptions as well as feelings of interest/enjoyment for the initial task (vigilance task) were related to feelings of interest/enjoyment on the Stroop task ($r = .26$, $p < .001$; $r = .28$, $p < .001$). To explore whether potential effects on Stroop interference could be explained by different motivational states with regard to the Stroop task, I assessed interest/enjoyment and, consequently, performed a post hoc test (cf. Field, 2018, p. 797).

Interest/enjoyment toward the Stroop task. There was a significant effect of condition on interest/enjoyment toward the Stroop task, $F(3, 175) = 2.676$, $p = .049$, $\omega^2 = 0.027$ (see Figure 6). To test the differences between conditions, I conducted post hoc tests (Tukey, Gabriel's and Dunnett's test).[20] Tukey tests revealed non-significant differences between conditions where participants only received controlling rationales and autonomy support

[20] According to Field (2018), these post hoc tests are suitable for the current analysis for the following reasons: Tukey's test controls very well for Type I error rate and is at the same time more powerful compared to Bonferroni when testing large numbers of means; Gabriel's test is recommended when sample sizes are not equal. Lastly, I chose Dunnett's test, because it is the only multiple comparison that allows to test means against a control mean, in this case the condition 1 (Field, 2018, chapter 12.5).

respectively, p = 1.000, g_s = -0.11, 90% CI [-.361, .339], and between conditions where participants self-generated autonomous rationales in addition to receiving controlling rationales, p = .072, g_s = 0.46, 90% CI[.131, .795], or in addition to receiving autonomy support, p = .967, g_s = .097, 90% CI[-.253, .448]. Similarly, Gabriel's tests revealed the same pattern. In contrast however, Dunnett's test revealed a significant difference in interest/enjoyment between participants who received a controlling rationale only and who additionally self-generated autonomous rationales, p = .042, g_s = .46, 90% CI[.131, .795].

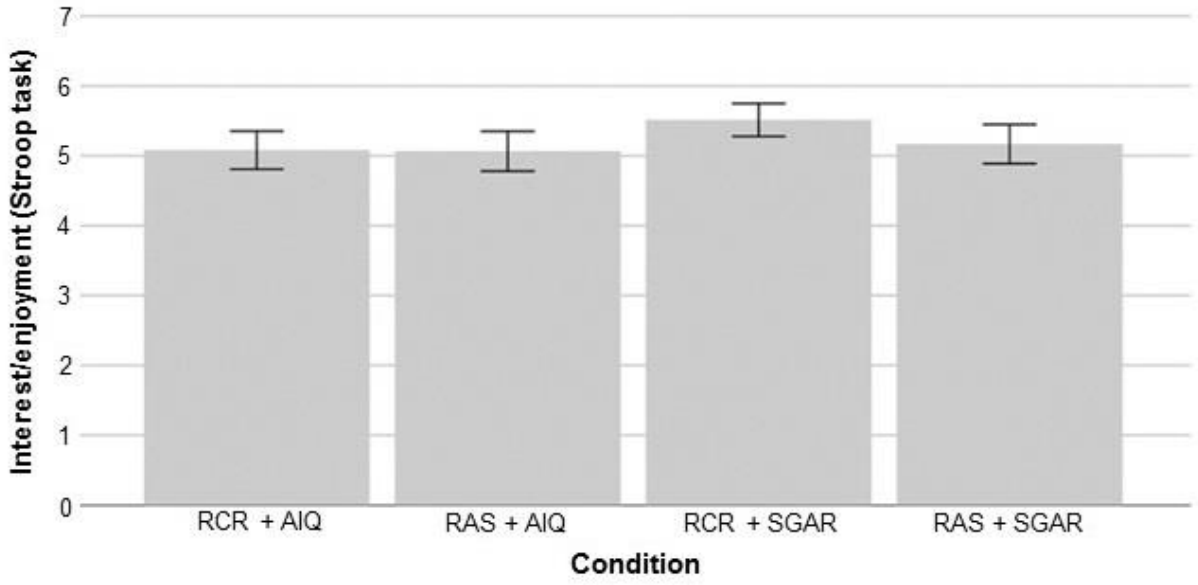

Figure 6. Results from Study 1: Mean values of interest/enjoyment (Stroop task) for each experimental condition.

4.1.4 Discussion

With the current study, I wanted to confirm that receiving autonomy support, compared to receiving controlling rationales for engaging in a boring task, has a more-positive effect on motivation-related outcomes; furthermore, I wanted to test the hypothesis that self-generating autonomous rationales in addition to receiving controlling rationales counteracts detrimental effects of controlling rationales.

My findings, indeed, replicated previous findings (Deci et al., 1994; Muraven et al., 2008) by showing that receiving autonomy support for engaging in a boring task, in contrast to receiving controlling rationales, had a positive impact on motivational and self-regulatory outcomes. Furthermore, it provided first evidence that self-generating autonomous rationales in addition to receiving controlling rationales positively affects value/usefulness perceptions and interest/enjoyment toward an otherwise uninteresting task comparted to receiving controlling rationales only (small effect sizes); moreover, it showed that self-generating

autonomous rationales is associated with enhanced self-regulatory performance in a seemingly unrelated, subsequent task (small-sized effect).

My findings regarding the effectiveness of self-generated autonomous rationales substantiate speculations by self-determination theory researchers (e.g., Jang, 2008; Ryan & Deci, 2008; Vansteenkiste et al., 2018). They furthermore support the notion that self-generating value not only bears benefits for long-term goal pursuit (e.g., Canning & Harackiewicz, 2015; Hulleman et al., 2010), but also for short-term activity engagement; in addition to that the current research expands on previous research on self-generated rationales (e.g., Canning & Harackiewicz, 2015) by demonstrating, in line with self-determination theory, that taking rationales' motivational quality into account is crucial with regard to a rationale's effectiveness.

In contrast to my predictions, however, I did not find differences between conditions regarding self-regulatory performance in the initial task. Regarding this issue, it might be that controlling forms as well as autonomous forms of regulation have sufficed to perform well on this fairly easy and rather monotonous task (cf. Cerasoli et al., 2014; Steingut et al., 2017).

Moreover, in contrast to my hypothesis, I found neither a positive effect of autonomy support on subsequent self-regulation (see for example Muraven et al., 2008), nor such an effect when people self-generated autonomous rationales in addition to receiving autonomy support. However, the situation was different for participants who self-generated autonomous rationales in addition to receiving controlling rationales for engaging in the vigilance task: They showed better performance in the Stroop task compared to participants who received controlling rationales only, and scored highest in interest/enjoyment toward the Stroop task compared to all other participants. Taking both findings into account, I consider a spill-over effect of self-generating autonomous rationales as an explanatory factor; participants may also have self-generated rationales for engaging in the Stroop task. However, it remains unclear, as to why I did not find this effect in the condition where people self-generated autonomous rationales in addition to receiving autonomy support. Thus, I aim at replicating these findings in consecutive studies. Nevertheless, my findings regarding the effectiveness of self-generated autonomous rationales in addition to receiving controlling rationales substantiate the idea that motivation quality has effects beyond the focal activity and that increasing motivation quality can buffer detrimental carry over effects (see also Inzlicht et al., 2014).

In sum, by showing that self-generating autonomous rationales has positive effects on desirable outcomes similar to (and perhaps even beyond) autonomy support, the current results provide an incremental contribution to the self-determination theory literature (Deci et al., 1994; Legault & Inzlicht, 2013; Reeve et al., 2002; Steingut et al., 2017). These findings furthermore add to previous findings regarding the positive motivation-related effects of self-generated rationales drawing on expectancy-value theory (e.g., Canning & Harackiewicz,

2015; Hulleman et al., 2010) and extend this line of research by taking rationales of different motivational quality into account.

4.1.4.1 Limitations and suggestions for future research.

As it is the case for any study, a number of limitations deserve to be mentioned. One such limitation is that drop-out rates due to application of exclusion criteria were unexpectedly high. Regarding this issue, I had to exclude several participants, because they either did not comply with the instructions to self-generate rationales and/or seemed to have misunderstood the instructions regarding the vigilance task (i.e., the first task). As insufficient German speaking skills could explain this, replication studies should ensure sufficient knowledge of German among participants.

Moreover, the finding that self-generating autonomous rationales in addition to receiving controlling rationales enhances self-regulatory performance in a subsequent task compared to receiving controlling rationales only, should be interpreted with some caution. A widely publicized registered replication report failed to find any evidence of self-regulatory failure subsequent to some initial act (Hagger et al., 2016). Moreover, the process via which this effect could potentially come about is a topic of much debate (see Inzlicht & Friese, 2019). In view of this discussion (see Inzlicht & Friese, 2019), I recommend to replicate the findings in preregistered studies and to investigate the role of motivation as a mediator in future research.

4.1.4.2 Conclusion.

In sum, the current study supports previous findings on the effectiveness of autonomy support on value/usefulness as well as interest/enjoyment, which are both constituents of autonomous motivation. Moreover, it provides an incremental contribution to research on self-generating rationales. However, in my study, the pattern of results poses several questions, especially with regard to self-regulatory performance in the subsequent task (cf. Inzlicht & Friese, 2019; Schmidt, 2009). Thus, I plan to replicate my findings in subsequent studies. In light of these replication studies' findings, I will discuss my findings in more detail below.

4.2 Study 2: Replication of Study 1

With Study 2, I sought to replicate (and extend) findings from Study 1. To that end, methods, directional hypotheses, and analysis plan for this study (exclusion criteria and planned contrasts) remained the same (see Brandt et al., 2016). I planned to replicate the finding that regardless of the rationale's motivational quality for engaging in the initial activity, self-generating autonomous rationales increases indicators of autonomous motivation (task-related value/usefulness as well as feelings of interest/enjoyment); moreover, I aimed at replicating the findings that self-generating autonomous rationales in addition to receiving controlling rationales compared to only receiving controlling rationales was positively associated with interest/enjoyment toward a subsequent task as well as with self-regulatory success/performance in it.

I extended the original study as follows: I extended the study by additionally assessing mental fatigue toward the initial as well as the subsequent task. This was inspired by research showing that rising levels of fatigue is associated with declines in the willingness to invest effort (Hopstaken, van der Linden, Bakker, & Kompier, 2015; Müller & Apps, 2018). Furthermore, in order to detect a spill-over effect, I additionally assessed value/usefulness regarding the subsequent task and asked participants whether or not they were thinking about the benefits of performing this task. Moreover, in the current replication study, I assessed a baseline for Stroop performance: Specifically, I asked a random sample of participants to start the experiment with the Stroop task without manipulating their motivation (control condition).

4.2.1 Methods

4.2.1.1 Participants.

A Power analysis (G*Power) for independent t Tests suggested that 142 participants (71 participants per condition) would provide at least 80% statistical power to detect the hypothesized effect on Stroop interference between participants who self-generated autonomous rationales in addition to receiving controlling rationales for engaging in the initial, boring task and participants who received controlling rationales only.[21] Since I have four conditions in the replication study, I aimed for a sample size of N = 284 participants.[22] I tried my best to recruit this number of participants for Study 2, but because I was not able to recruit enough participants who had no knowledge about the study's rationale and because I had to

[21] In Study 1, planned contrasts revealed a significant difference on Stroop interference between participants who self-generated autonomous rationales in addition to receiving controlling rationales for engaging in the initial, boring task and participants who received controlling rationales only, t (86.023) = -2.091, p = .040, r = .17.

[22] In order to assess a baseline for Stroop performance (control group), I plan to examine an additional 71 participants, resulting in a total sample size of N = 355.

exclude participants from the dataset (see the Data Diagnostics section), my final sample size was less then I hoped[23]: Finally, I recruited 234 German speaking students from the Technical University of Munich, who conducted this study for the first time and participated in exchange for course credit (mean age = 21.49, SD = 2.70; range 18–33; 100 female, 134 male). Students carried out tasks and self-reports at computers in the lab of the Chair of Psychology at the Technical University of Munich. The experiment was embedded in a series of studies and took approximately 30 minutes. Application of criteria for post-data collection exclusion of participants, described in the Data Diagnostic section below, resulted in a total of 213 participants for which I could conduct further analyses.

4.2.1.2 Procedure.

Materials and procedure were the same as in Study 1 except for one minimal change, as I abandoned the exploratory questions in the course of asking participants for their value/usefulness perceptions during the vigilance task. In parallel to the original study, I tested the hypotheses in a 2 (receiving autonomy supportive rationales vs. receiving controlling rationales) x 2 (self-generating autonomous rationales vs. answering irrelevant questions) factorial design; in addition to that there was a fifth condition as a true control condition for the performance in the subsequent task. As a consequence of this procedure, participants were randomly assigned to one of five conditions: (1) receiving controlling rationales & answering irrelevant questions (RCR + AIQ), (2) receiving autonomy support & answering irrelevant questions (RAS + AIQ), (3) receiving controlling rationales & self-generating autonomous rationales (RCR + SGAR), (4) receiving autonomy support & self-generating autonomous rationales (RAS + SGAR), (5) engaging in the Stroop task without manipulation (control condition). As in Study 1, participants reported their perception of value/usefulness perceptions during the vigilance task and their feelings of interest/enjoyment after the vigilance task as well as after the Stroop task. After answering questions regarding their feelings of interest/enjoyment as a feature of autonomous motivation toward the Stroop task, participants gave a retrospective account of their feelings of mental fatigue with regard to the initial task (i.e., the vigilance task) as well as to the Stroop task and their value/usefulness perceptions with regard to the Stroop task. Lastly, they indicated whether they had spontaneously self-generated autonomous rationales toward the Stroop task and were then debriefed and thanked.

[23] Consequently, I conducted the study a third time; this time I could recruit participants from another pool because I conducted the study in another lab at the TUM (see Study 3).

4.2.1.3 Measures.

Value/usefulness of the vigilance task. I assessed value/usefulness with two items ("I believe working on this task could be beneficial to me", "I think it is important that I work on this task"). Participants responded on a 7-point scale ranging from 1, "I don't agree at all", to 7, "I totally agree".

Self-regulatory performance (vigilance task). Greater numbers of correct hits in the vigilance task indicated self-regulatory performance.

Interest/enjoyment toward the vigilance task. Participants completed the seven-item interest/enjoyment subscale of the Intrinsic Motivation Inventory (IMI; e.g., Ryan, 1982). Sample items include "I enjoyed doing this activity very much", and "I would describe this activity as very interesting". Interest/enjoyment ratings ranged from 1 (*not at all true*) to 7 (*very true*).

Subsequent self-regulatory performance (Stroop task). As a measure of self-regulatory success in the Stroop task, I calculated Stroop interference – the difference in reaction time between correctly detected congruent and incongruent trials (e.g., Job et al., 2013; Kazén & Kuhl, 2005).

Interest/enjoyment toward the Stroop task. To assess participants' feelings of autonomous motivation toward the subsequent Stroop task, they completed the seven-item interest/enjoyment subscale of the Intrinsic Motivation Inventory (IMI; e.g., Ryan, 1982).

For exploratory reasons, I further asked participants to give a retrospective account of their value/usefulness perceptions toward the Stroop task as well as their subjective mental fatigue with regard to both tasks. Lastly, to investigate a potential spill-over effect in the self-generating rationale conditions, I asked participants whether they had thought about how they could benefit from performing the Stroop task (i.e., spontaneously self-generated rationales).

Value/usefulness of the Stroop task. I assessed participants' value/usefulness perceptions toward the Stroop task after task completion with two items ("I thought that working on the task will be beneficial for me", "I thought it was important that I work on this task"). Value/usefulness ratings ranged from 1 (*I don't agree at all*) to 7 (*I totally agree*).

Subjective mental fatigue (during the vigilance task/Stroop task). In contrast to Study 1, in Study 2 I assessed participants subjective mental fatigue with regard to both tasks, for exploratory reasons. To assess subjective mental fatigue I used the following four items at the end of the experiment: "When I performed the task, I was able to keep my thoughts on it", "I concentrated well", "During task performance, my thoughts often wandered", and "It took a lot of effort to concentrate on the task". These items were adapted from the mental fatigue subscale of the Multidimensional Fatigue Inventory (MFI, Smets, Garssen, Bonke, & De Haes, 1995; see also Clarkson, Hirt, Austin Chapman, & Jia, 2011).

*Thinking about the benefits of the Stroop task.*To examine whether there was a spill-over effect on the subsequent task of instructing participants to self-generate autonomous rationales toward the initial task, I asked the following question: “Before or during the completion of the second task (colors and words), did you think about how you could benefit from performing this task?”

Baseline of the Stroop task. In order to assess a baseline for Stroop performance, I examined Stroop interference in an additional control group (i.e., control condition). In this condition, participants started the experiment with performing the Stroop task and worked on the vigilance task as the subsequent task. In this condition, participants reported on the same scales as participants in the other conditions. Finally, they reported their socio-demographics and were debriefed and thanked.

4.2.1.4 Data Diagnostics.

Four participants showed signs of noncompliance with instructions regarding self-generating autonomous rationales; therefore, they were excluded from further analysis.

Similar to Study 1, the frequency distribution of false presses (i.e., false alarms) in the vigilance task was positively skewed: Most participants had no or few false presses, however, some participants had a large number (cf. Giambra & Quilter, 1989). Thus, in parallel to Study 1, I set the following exclusion criterion in order to differentiate false alarms due to a misunderstanding of the instructions from false alarms which are attributable to self-regulatory failure: false alarm rate (F) less than 5%. Due to an error in storing the data and, thus, in contrast to Study 1, the maximum number of correct hits in Study 2 was 22 (instead of 30) and the maximum number of false alarms was 830 (instead of 1077); consequently, eleven participants with more than 42 false alarms (i.e., 5% false alarm rate) were removed from the dataset.

Only non-colorblind participants were included in further analysis, because colorblindness is an exclusion criterion with regard to the Stroop task (cf. Job et al., 2013; Kazén & Kuhl, 2005). Parallel to Study 1 and in line with previous research using Stroop interference, I corrected Data on the trial level (i.e., outlying trials within each individual) and on the group level (i.e., outlying participants) by applying the following exclusion criteria: First, with regard to outlying trials, I removed responses faster than 300 ms from the dataset (cf. Jostmann & Koole, 2007; Kazén & Kuhl, 2005). Second, to exclude outlying participants from further analysis, I checked for participants who answered fewer than half of the incongruent trials correctly (cf. Job et al., 2013). As a consequence, 12 more participants were excluded from analysis with regard to the variable Stroop interference.

4.2.2 Results

As a result of applying these exclusion criteria, I could conduct further analyses for 213 participants (condition 1, RCR + AIQ: n = 50; condition 2: RAS + AIQ: n = 47; condition 3: RCR + SGAR: n = 49; condition 4: RAS + SGAR: n = 67).

The intercorrelations, means, standard deviations and Cronbach's α of the main measures can be seen in Table 4.

Table 4

Study 2: Intercorrelations, Means, Standard Deviations, and Chronbach's α

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Value/usefulness (during vigilance task)	-							
2. Interest/enjoyment (after vigilance task)	.42**	-						
3. Correct hits (performance vigilance task)	.18**	.10	-					
4. Interest/enjoyment (Stroop task)	.18**	.10	-.09	-				
5. Stroop interference (performance Stroop task)	.01	-.05	-.03	-.15*	-			
6. Value/usefulness (Stroop task)	.50**	.23**	-.03	.50**	.03	-		
7. Mental fatigue (vigilance task)	-.14*	-.39**	.06	.15*	.04	.01	-	
8. Mental fatigue (Stroop task)	-.09	-.08	-.05	-.36**	.19**	-.16*	.02	-
Mean	4.00	3.18	20.71	5.06	166.02	4.37	3.20	1.99
SD	1.47	1.14	2.26	.89	215.73	1.41	1.03	.69
Cronbach's *α*	.67	.79		.77		.66	.85	.68

Note. Correlation analyses were conducted including only those participants for whom valid data were available (n = 213). Due to further Stroop task specific exclusion criteria described below, for variable Stroop interference n = 201.
*p < .05
**p< .01

4.2.2.1 Effects on Dependent Variables.

Value/usefulness of the vigilance task: An analysis of variance (ANOVA) revealed a significant overall effect of condition on value/usefulness perceptions, F(3, 209) = 5.821, p = .001, ω^2 = .064. Planned contrasts (simple first) showed that receiving autonomy support only (RAS + AIQ: M = 4.06, SD = 1.32) compared to receiving controlling rationales only (RCR + AIQ: M = 3.42, SD = 1.62) was associated with perceiving more value/usefulness toward the vigilance task, t(93.096) = 2.153, p = .034, *r* = .15. Similarly, self-generating autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 4.51, SD = 1.28), led

to larger effects on value/usefulness perceptions compared to receiving controlling rationales only, t(91.288) = 3.907, p = .000, *r* = .27. Participants who self-generated autonomous rationales in addition to receiving controlling rationales, however, reported as much value/usefulness as participants who only received controlling rationales (RCR + SGAR: M = 3.85, SD = 1.48), t(96.523) = 1.369, p = .174, *r* = .10.

Self-regulatory performance in the vigilance task: Due to a coding error, hits and false alarms in the first part of the vigilance task were not collected for 27 participants. Thus, to operationalize self-regulatory performance in the vigilance task, in the present study I calculated correct hits in the second part of the vigilance task (maximum 22 hits). Assignment to condition did not have an effect on self-regulatory performance in the vigilance task (i.e., correct hits), F(3, 209) = .555, p = .646, ω^2 = -.006. Moreover, planned contrasts did not reveal significant differences of conditions involving autonomous rationales compared to the condition where participants received a controlling rationale only. More precisely, self-regulatory performance in the vigilance task did not differ between participants who were provided with a controlling rationale only (RCR + AIQ: M = 20.66, SD = 1.84) and participants who were provided with an autonomy support only (RAS + AIQ: M = 20.70, SD = 1.59; t(94.350) = .121, p = .904, *r* = .06), who self-generated autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 20.43, SD = 3.55; t(71.609) = -.406, p = .686, *r* = .04) or in addition to receiving autonomy support (RAS+SGAR: M = 20.97, SD = 1.68; t(100.227) = .937, p = .351, *r* = .05).

Interest/enjoyment toward the vigilance task: There was a significant overall effect of condition on interest/enjoyment toward the vigilance task, F(3, 209) = 5.296, p = .002, ω^2 = .057. Planned contrasts (simple first) revealed that receiving autonomy support only (RAS + AIQ: M = 3.54, SD = 1.23) compared to receiving controlling rationales only (RCR + AIQ: M = 2.71, SD = .93) was associated with experiencing more interest/enjoyment toward the vigilance task, t(85.845) = 3.758, p = .000, *r* = .25. Similarly, self-generating autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 3.34, SD = 1.15), had larger effects on interest/enjoyment compared to receiving controlling rationales only, t(114.115) = 3.300, p = .001, *r* = .21. Participants who self-generated autonomous rationales in addition to receiving controlling rationales, however, reported as much interest/enjoyment as participants who only received controlling rationales (RCR + SGAR: M = 3.08, SD = 1.11), t(93.542) = 1.808, p = .074, *r* = .12.

Self-regulatory performance in the Stroop task: Overall, condition did not have a significant effect on Stroop interference, F(3, 197) = 1.020, p = .385, ω^2 = .000. Planned contrasts revealed non-significant differences in Stroop interference between receiving controlling rationales (RCR + AIQ: M = 199.18, SD = 220.13) and receiving autonomy support only (RAS + AIQ: M = 147.39, SD = 225.17, t(89) = -1.109, p = .270, *r* = .08), self-generating

autonomous rationale in addition to receiving controlling rationales (RCR + SGAR: M = 129.22, SD = 180.99), t(84.830) = -1.647, p = .103, *r* = .11, and self-generating autonomous rationales in addition to receiving autonomy support respectively (RAS + SGAR: M = 181.74, SD = 227.45, t(96.746) = -.403, p = .688, *r* = .03).

4.2.2.2 Exploratory Analyses.

With regard to both tasks, interest/enjoyment was positively correlated with value/usefulness perceptions and negatively correlated with mental fatigue (see Table 2). Higher mental fatigue in the initial task was associated with higher interest/enjoyment toward the Stroop task, indicating a contrast effect. With regard to the Stroop task, Stroop interference was negatively correlated with interest/enjoyment and positively correlated with mental fatigue.

Subjective mental fatigue during the vigilance task: With regard to the vigilance task, the overall effect of condition on subjective mental fatigue during the task was non-significant, $F(3, 209) = 2.286$, $p = .080$, $\omega^2 = .018$. However, post hoc tests revealed that participants who received controlling rationales only, significantly differed, regarding subjective mental fatigue, to participants who received autonomy support only (Tukey: p = .060, Dunnett's t: p = .034, d_s = -.471, 90% CI [-.812, -.134]. In contrast, compared to participants who received controlling rationales only, neither participants who self-generated autonomous rationales in addition to receiving controlling rationales (Tukey: p = .379, Dunnett's t: p = .255, d_s = -0.311, 90% CI[-.645, .020]) nor participants who self-generated autonomous rationales in addition to receiving autonomy support (Tukey: p = .753, Gabriel: p = .889, Dunnett's t: p = .625, g_s = -.189, 90% CI[-.497, .119]) differed significantly in subjective mental fatigue.

In contrast to Study 1, the present study had a fifth condition: As this condition assessed the baseline of Stroop interference it served as a real control condition for the Stroop interference. Moreover, in the present study I conducted post hoc tests to explore the effect of condition on value/usefulness perceptions toward the Stroop task as well as on subjective mental fatigue after both tasks (Tukey to guarantee control over the Type I error rate and Gabriel's as sample sizes are slightly different, cf. Field, 2018). To test whether people were more likely to think about the benefits of the subsequent task based on if they self-generated rationales for the initial task or not, I created dummy variables and computed a logistic regression.

Baseline of Stroop interference: In a fifth condition, the control condition, there were 52 German speaking, non-colorblind students from the Technical University of Munich who also participated in exchange for course credit (mean age = 21.08, SD = 2.12; range 18–26; 21 female, 31 male). All participants conducted this study for the first time. Students carried out tasks and self-reports at computers in the lab of the Chair of Psychology at the Technical

University of Munich. Application of Stroop task specific exclusion criteria (see above) resulted in a total of 50 participants for which I could conduct further analyses.

The baseline for Stroop interference was M = 167.31, SD = 207.59 (for descriptive statistics of all five conditions see Table 5). There was no overall effect of condition on Stroop interference, F(4, 246) = .834, p = .505, ω^2 = -.003. To test the differences of conditions to the baseline, I conducted Dunnett's post hoc tests; they showed that none of the conditions significantly differed in Stroop interference from the baseline condition (i.e., Control condition; comparison to RCR + AIQ: p = .926, d_s = .135, 90% CI [-.203, .474]; comparison to RAS + AIQ: p = .938, d_s = -.125, 90% CI [-.462, .211]; comparison to RCR + SGAR: p = .702, d_s = -.243, 90% CI [-.583, .095] ; comparison to RAS + SGAR: p = .998, g_s = .045, 90% CI [-.265, .354]).

Table 5

Study 2: Means and Standard Deviations in Stroop interference

	Conditions	n	M	SD
1.	RCR + AIQ	45	199.18	220.13
2.	RAS + AIQ	46	147.39	225.17
3.	RCR + SGAR	45	129.22	180.99
4.	RAS + SGAR	65	181.74	227.45
5.	Control Condition	50	172.50	172.84
	Total	251	167.31	207.59

Interest/enjoyment toward the Stroop task: To check whether conditions differed with regard to interest/enjoyment toward the Stroop task (see Study 1), I conducted post hoc tests. The overall effect of conditions on interest/enjoyment toward the Stroop task was non-significant, F(3, 209) = 1.405, p = .243, ω^2 = .006. To test the differences between conditions, I conducted post hoc tests (Tukey's, Gabriel's and Dunnett's). Tukey's tests revealed non-significant differences between conditions where participants received controlling rationales only and autonomy support only, p = .574, d_s = -0.249, 90% CI[-.586, .085], where participants self-generated autonomous rationales in addition to receiving controlling rationales, p = .873, d_s = 0.142, 90% CI[-.189, .473], or where participants self-generated autonomous rationales in addition to receiving autonomy support, p = 1.000, g_s = -.011, 90% CI[-.319, .296]. Gabriel tests as well as Dunnett's tests confirmed this pattern of results.

Value/usefulness of the Stroop task: As Levene's test was significant (p = .031), homogeneity of variances could not be assumed and assumptions for conducting and ANOVA were violated; thus, I conducted a non-parametric Kruskal-Wallis test instead. Value/usefulness perceptions did not significantly differ between the conditions, H(3) = 6.018, p = .111. Consequently, multiple comparisons were not performed.

Subjective mental fatigue during the Stroop task: With regard to the Stroop task, condition did not have a significant effect on subjective mental fatigue during the Stroop task, F(3, 209) = .852, p = .467, ω^2 = -.002. Post hoc tests revealed non-significant differences in subjective mental fatigue between participants who received controlling rationales only and participants who received autonomy support only (Tukey: p = .505, Dunnett's t: p = .363, d_s = .284, 90% CI [-.051, .621], participants who self-generated autonomous rationales in addition to receiving controlling rationales (Tukey: p = .763, Dunnett's t: p = .637, d_s = .197, 90% CI[-.133, .530]), and participants who self-generated autonomous rationales in addition to receiving autonomy support (Tukey: p = .992, Gabriel: p = 1.000, Dunnett: p = .984, g_s = .060, 90% CI[-.248, .367]).

Thinking about the benefits of the subsequent task. I tested whether participants who received and/or self-generated autonomous rationales would be more inclined to think about benefits of the subsequent task compared to participants who received controlling rationales only. As findings from the logistic regression show, only particpants who received and self-generated autonomous rationales were more inclined to think about the benefits of the subsequent task, compared to participants who received controlling rationales only (see Table 6).

Table 6

Study 2: Results of logistic regression on thinking about benefits vs. not thinking about benefits

	b(SE)	95 CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Thinking about benefits vs. not thinking about benefits				
Intercept	-1.516 (.368)**			
RAS + AIQ	.855 (.480)	.918	2.351	6.022
RCR + SGAR	.884 (.475)	.954	2.420	6.139
RAS + SGAR	1.185 (.444)**	1.371	3.271	7.804

Note: R^2 = .037 (Cox & Snell), .051 (Nagelkerke). Model $\chi^2(3)$ = 7.995, p = .046.
*p < .05
**p< .01

4.2.3 Discussion

With Study 2, I partially replicated the results from the original study. In accordance with Study 1, Study 2 shows that in contrast to simply receiving controlling rationales for engaging in an uninteresting task, receiving autonomy support enhanced value/usefulness as well as interest/enjoyment (small effect sizes). However, I was not able to replicate the findings that self-generating autonomous rationales in addition to receiving controlling rationales

compared to receiving controlling rationales only, is associated with enhanced interest/enjoyment as well as better performance with regard to the subsequent task.

However, there is one crucial reason why the results of this study should be interpreted with caution: The experiment lacked power, because I could not recruit enough participants, who were blind to the study's goals. Thus, I cannot draw conclusions from the current study with regard to the original findings. Consequently, I decided to launch the experiment one more time in a different lab.

4.3 Study 3: Preregistered Replication of Study 1

In contrast to Study 1 and Study 2, Study 3 was preregistered[24]; furthermore, it was conducted in a different lab at the Technichal University of Munich and participants were incentivized with money instead of course credits.

4.3.1 Method

4.3.1.1 Participants.

In parallel to Study 2, the effect size in my power analysis was specified to equal that reported in the original study (conditional power); thus, in Study 3, I also aimed for a sample size of N = 284 participants.[25] In contrast to Study 1 and Study 2, I conducted this experiment in the laboratory for experimental research in economics (i.e., experimenTUM).[26] I recruited 287 German speaking students and employees from the Technical University of Munich, who conducted this study for the first time and were compensated with 6€ for their participation (mean age = 24.18, SD = 6.73; range 18–67; 115 female, 172 male). Students carried out tasks and self-reports at computers in the lab. The experiment was embedded in a series of studies and took approximately 30 minutes. Application of criteria for post-data collection exclusion of participants, described in the Data Diagnostic section below, resulted in a total of 275 participants for which I could conduct further analysis.

4.3.1.2 Materials and procedure.

Materials and procedure were the same as in Study 1; additionally, the extensions to Study 1 as described in Study 2 were adopted. Compared to Study 2, two minor changes were made: First, as feedback from participants in Study 2 revealed, the instructions of the vigilance task were too vague at one point. Instead of translating the word “skip” into German with the word “überspringen”, I chose the word “auslassen” which is more precise. Second, instructions for the vigilance task in conditions where participants received controlling rationales, referred to the compensation of 6€ (instead of course credits as in Study 2).

[24] https://aspredicted.org/55ii3.pdf
[25] In order to assess a baseline for Stroop performance (control group), I plan to examine an additional 71 participants, resulting in a total sample size of N = 355.
[26] This experiment was funded by experimenTUM.

4.3.1.3 Data Diagnostics.

Eight participants showed signs of noncompliance with instructions with respect to self-generating autonomous rationales and were, therefore, excluded from further analyses.

As in the previous two studies, in Study 3 the frequency distribution of false presses (i.e., false alarms) in the vigilance task was positively skewed: Most participants had no or few false presses, however, several participants had a very large number (cf. Giambra & Quilter, 1989). In order to differentiate false alarms due to a misunderstanding of the instructions from false alarms which are attributable to self-regulatory failure, I set following exclusion criterion: false alarm rate (F) less than 5%. Consequently, as there were 1107 trials with a maximum number of 30 correct hits and a maximum number of 1077 false alarms, participants with more than 54 false alarms were removed from the dataset. Consequently, one further participant was excluded from the further analyses.

As colorblindness is an exclusion criterion with regard to the Stroop task, (cf. Job et al., 2013; Kazén & Kuhl, 2005) three more participants were excluded from further analysis. Parallel to Study 1 and Study 2 and in line with previous research using Stroop interference, I corrected Data on the trial level (i.e., outlying trials within each individual) and on the group level (i.e., outlying participants) by applying the following exclusion criteria: First, with regard to outlying trials, I removed responses faster than 300 ms from the dataset (cf. Jostmann & Koole, 2007; Kazén & Kuhl, 2005). Second, to exclude outlying participants from further analysis, I checked for participants who answered fewer than half of the incongruent trials correctly (cf. Job et al., 2013). As a consequence, 14 participants were excluded from the analysis with regard to the variable Stroop interference.

4.3.2 Results

As a result of applying these exclusion criteria, I could conduct the analyses for 275 participants (condition 1, RCR + AIQ: n = 75; condition 2: RAS + AIQ: n = 71; condition 3: RCR + SGAR: n = 68; condition 4: RAS + SGAR: n = 61).

The intercorrelations, means, standard deviations and Cronbach's α of the main measures can be seen in Table 7.

Table 7

Study 3: Intercorrelations, Means, Standard Deviations, and Chronbach's α

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Value/usefulness (during vigilance task)	-							
2. Interest/enjoyment (after vigilance task)	.63**	-						
3. Correct hits (performance vigilance task)	.16**	.22*	-					
4. Interest/enjoyment (Stroop task)	.16**	.24**	.03	-				
5. Stroop interference (performance Stroop task)	-.12	-.08	-.07	.09	-			
6. Value/usefulness (Stroop task)	.59**	.59**	.18*	.41**	.13*	-		
7. Mental fatigue (vigilance task)	-.29**	-.29**	-.24*	.15	.02	-.11	-	
8. Mental fatigue (Stroop task)	-.07	-.06	-.16**	-.45**	.21**	-.13*	-.04	-
Mean	3.54	3.20	27.67	5.04	197.28	4.03	3.30	2.07
SD	1.61	1.15	2.64	.98	197.31	1.63	.96	.73
Cronbach's α	.79	.80		.79		.78	.83	.67

Note. Correlation analyses were conducted including only those participants for whom valid data were available (n = 275). Due to further Stroop task specific exclusion criteria described below, for variable Stroop interference n = 261.
*p < .05
**p< .01

4.3.2.1 Effects on Dependent Variables.

Value/usefulness of the vigilance task: An analysis of variance (ANOVA) revealed an effect of condition on value/usefulness perceptions toward the vigilance task, F(3, 271) = 10.746, p = .000, ω^2 = .096. Planned contrasts revealed that receiving autonomy support only (RAS + AIQ: M = 4.09, SD = 1.61) compared to receiving controlling rationales only (RCR + AIQ: M = 2.93, SD = 1.32) led to larger effects on perceiving value/usefulness in the vigilance task, t(135.611) = 4.734, p = .000, *r* = .27. Similarly, self-generating autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 4.06, SD = 1.54) compared to receiving controlling rationales only, led to larger effects on subjective value, t(118.800) = 4.532, p = .000, *r* = .25. However, participants who self-generated autonomous rationales in addition to receiving controlling rationales, reported as much value/usefulness as participants who only received controlling rationales (RCR + SGAR: M = 3.16, SD = 1.64), t (128.838) = .938, p = .350, *r* = .06.

Self-regulatory performance in the vigilance task: There was no overall effect of condition on self-regulatory performance in the vigilance task (i.e., correct hits), F(3, 271) = .763, p = .516, ω^2 = -.003. Moreover, planned contrasts revealed non-significant differences in self-regulatory performance between participants who received a controlling rationale only (RCR + AIQ: M = 27.37, SD = 2.68) and participants who received autonomy support only (RAS + AIQ: M = 28.03, SD = 2.13; t(139.835) = 1.642, p = .103, *r* = .09), participants who self-generated autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 27.68, SD = 2.71; t(139.300) = 0.673, p = .502, *r* = .04), and participants who received autonomy support and self-generated autonomous rationales in addition (RAS+SGAR: M = 27.61, SD = 3.04; t(120.712) = .470, p = .639, *r* = .03).

Interest/enjoyment toward the vigilance task: An analysis of variance (ANOVA) showed a non-significant effect of condition on interest/enjoyment, F(3, 271) = 2.582, p = .054, ω^2 = 0.017. Moreover, planned contrasts (simple first) revealed non-significant differences in interest/ enjoyment between participants who received controlling rationales only (RCR + AIQ: M = 3.06, SD = 1.06) and participants who received autonomy support only (RAS + AIQ: M = 3.41, SD = 1.18; t(140.387) = 1.874, p = .063, *r* = .11), participants who self-generated autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 2.97, SD = 1.18, t(135.272) = -.499, p = .619, *r* = .03), and participants who self-generated autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 3.37, SD = 1.13, t(125.030) = 1.631, p = .105, *r* = .10).

Self-regulatory performance in the Stroop task: There was no overall effect of condition on Stroop interference, F(3, 257) = .641, p = .589, ω^2 = -.004. Planned contrasts (simple first) revealed non-significant differences in Stroop interference between participants who received controlling rationales only (RCR + AIQ: M = 198.27, SD = 190.83) and participants who received autonomy support only (RAS + AIQ: M = 169.98, SD = 215.27, t(132.137) = -.836, p = .405, *r* =.05), participants who self-generated autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 208.51, SD = 193.93), t(133.110) = .292, p = .771, *r* = .02, and participants who self-generated autonomous rationales in addition to receiving autonomy support (RAS + SGAR: M = 214.50, SD = 188.78, t(120.865) = .464, p = .644, *r* = .03).

4.3.2.2 Exploratory Analyses.

With regard to both tasks, interest/enjoyment was positively correlated with value/usefulness perceptions. In contrast to Study 2, however, correlation of interest/enjoyment toward the vigilance task with mental fatigue in the Stroop task was not significant; thus, in this study there were no indications for a contrast effect. With regard to the

Stroop task, Stroop interference was not significantly correlated with interest/enjoyment, but, in line with findings from Study 2, positively correlated with mental fatigue.

Interest/enjoyment toward the Stroop task: In Study 3, the overall effect of condition on interest/enjoyment toward the Stroop task was non-significant, $F(3, 271) = 1.316$, $p = .269$. $\omega^2 = .003$. Moreover, post hoc tests revealed non-significant differences in interest/enjoyment between participants who received controlling rationales only and participants who received autonomy support only (Tukey: $p = .942$, Gabriel: $p = .994$, Dunnett's t: $p = .900$, $d_s = -.087$, 90% CI [-.360, .185], participants who self-generated autonomous rationales in addition to receiving controlling rationales (Tukey: $p = .964$, Gabriel: $p = .997$, Dunnett's t: $p = .935$, $g_s = .084$, 90% CI [-.192, .359]), and participants who self-generated autonomous rationales in addition to receiving autonomy support (Tukey: $p = .500$, Gabriel: $p = .651$, Dunnett's t: $p = .368$, $g_s = .243$, 90% CI[-.041, .528]).

Baseline of Stroop interference: In a fifth condition, the control group consisted of 47 German speaking, non-colorblind students from the Technical University of Munich who conducted this study for the first time and were compensated with 6€ for their participation (mean age = 24.15, SD = 6.12; range 18–60; 17 female, 30 male). Students carried out tasks and self-reports at computers in TUM's laboratory for experimental research in economics. Application of Stroop task specific exclusion criteria (see above) resulted in a total of 42 participants for which I could conduct further analysis. The baseline for Stroop interference was M = 282.62, SD = 299.95 (for a comparison to the other conditions see Table 8).

Table 8

Study 3: Means and Standard Deviations in Stroop interference

	Conditions	n	M	SD
1.	RCR + AIQ	72	198.90	190.83
2.	RAS + AIQ	67	169.98	215.27
3.	RCR + SGAR	65	208.51	193.93
4.	RAS + SGAR	57	214.50	188.78
5.	Control Condition	42	282.62	299.95
	Total	303	209.11	215.88

The overall effect of condition on Stroop interference was non-significant, $F(4, 298) = 1.837$, $p = .122$, $\omega^2 = .011$. To test the differences between the four conditions to the baseline condition, I conducted Hochberg's GT2, which is indicated when group sizes are very different, as well as Dunnett's post hoc tests. GT2 post hoc tests revealed that none of the conditions significantly differed from the Stroop interference baseline (i.e., Control condition; comparison to RCR + AIQ: $p = .370$, $g_s = -.354$, 90% CI [-.675, -.032]; comparison to RAS + AIQ: $p = .078$, $gs = -.449$, 90% CI [-.776, -.121]; comparison to RCR + SGAR: $p = .573$, $g_s = -.308$, 90% CI

[-.635, -.020]; comparison to RAS + SGAR: p = .717, g_s = -.281, 90% CI [-.618, .055]). Dunnett's tests mostly confirmed this pattern, but indicated that participants who only received autonomy supportive rationales significantly differed in Stroop interference from participants in the baseline condition (p= .027).

Value/usefulness of the Stroop task: In Study 3, there was a significant overall effect of condition on value perceptions toward the Stroop task, F(3, 271) = 3.763, p = .011. ω^2 = .029. Post hoc tests, however, revealed non-significant differences in value/usefulness perceptions between participants who received controlling rationales only and participants who received autonomy support only (Tukey: p = .304, Gabriel: p = .402, Dunnett's t: p = .202, g_s = .289, 90% CI [.017, .564], participants who self-generated autonomous rationales in addition to receiving controlling rationales (Tukey: p = .886, Gabriel: p = .977, Dunnett's t: p = .814, g_s = -.120, 90% CI [-.396, .155]), and participants who self-generated autonomous rationales in addition to receiving autonomy support (Tukey: p = .119, Gabriel: p = .149, Dunnett's t: p = .071, g_s = .412, 90% CI[.125, .698]).

Subjective mental fatigue during the vigilance task: The overall effect of condition on subjective mental fatigue during the vigilance task was non-significant, F(3, 271) = 1.481, p = .220, ω^2 = .005. Moreover, post hoc tests revealed non-significant differences in subjective mental fatigue between participants who received controlling rationales only and participants who received autonomy support only (Tukey: p = .558, Gabriel: p = .719, Dunnett's t: p = .423, d_s = -.220, 90% CI [-.494, .053], participants who self-generated autonomous rationales in addition to receiving controlling rationales (Tukey: p = .571, Gabriel: p = .733, Dunnett's t: p = .436, g_s = -.204, 90% CI [-.480, .072]), and participants who self-generated autonomous rationales in addition to receiving autonomy support (Tukey: p = .974, Gabriel: p = .999, Dunnett's t: p = .954, g_s = .078, 90% CI[-.205, .362]).

Subjective mental fatigue during the Stroop task: The overall effect of condition on subjective mental fatigue during the Stroop task was non-significant, F(3, 271) = 1.281, p = .281, ω^2 = .003. Moreover, post hoc tests revealed non-significant differences in subjective mental fatigue between participants who received controlling rationales only and participants who received autonomy support only (Tukey: p = .991, Gabriel: p = 1.000, Dunnett's t: p = .984, g_s = .038, 90% CI [-.234, .310], participants who self-generated autonomous rationales in addition to receiving controlling rationales (Tukey: p = .927, Gabriel: p = .990, Dunnett's t: p = .876, g_s = -.108, 90% CI [-.384, .167]), and participants who self-generated autonomous rationales in addition to receiving autonomy support (Tukey: p = .404, Gabriel: p = .533, Dunnett's t: p = .283, g_s = -.281, 90% CI[-.566, .004]).

Thinking about the benefits of the Stroop task. In parallel to Study 2, I tested whether participants who received and/ or self-generated autonomous rationales would be more inclined to think about benefits of the subsequent task compared to participants who only

received controlling rationales. Findings from the logistic regression are depicted in Table 9. No significant differences between conditions were found.

Table 9

Study 3: Results of logistic regression on thinking about benefits vs. not thinking about benefits

	b(SE)	95 CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Thinking about benefits vs. not thinking about benefits				
Intercept	-1.227 (.276)**			
RAS + AIQ	.220 (.385)	.587	1.247	2.649
RCR + SGAR	.049 (.397)	.482	1.050	2.287
RAS + SGAR	.583 (.386)	.841	1.791	3.814

Note: R^2 = .010 (Cox & Snell), .015 (Nagelkerke). Model $\chi^2(3) = 2.765$, p = .429.
*p < .05
**p< .01

4.3.3 Discussion

With the present preregistered Study, I attempted to replicate the findings from the original study. In accordance with Study 1, the current study shows that in contrast to simply receiving controlling rationales for engaging in an uninteresting task, receiving autonomy support only as well as receiving autonomy support and self-generating autonomous rationales in addition, enhances value/usefulness toward the task (medium effect size). However, the results are consistent with a null effect of self-generating autonomous rationales in addition to receiving controlling rationales compared to receiving controlling rationales only.

As, in contrast to the first study, in this study self-generating autonomous rationales in addition to receiving controlling rationales did not seem to have a stronger effect on (e.g.) task interest/enjoyment than receiving controlling rationales only, I cannot draw conclusions from the current study with regard to the original findings. The fact that I did not find any differences in Stroop interference could also be due to the fact that the sample size was too small due to the application of exclusion criteria in connection with the Stroop task (lacking power). However, since receiving autonomy support compared to receiving controlling rationales had an effect, indicates that the quality of motivation makes a difference. My null findings regarding the effectiveness of self-generating autonomous rationales on value/usefulness and interest/enjoyment toward the vigilance task could indicate that the manipulation was not strong enough or that the related findings in Study 1 could be due to a Type 1 error.

In the following, I will compare and discuss in more detail the findings of Study 1, 2, and 3.

4.3.4 Discussion of Study 1, 2 and 3

Rationales play an essential role with regard to motivation because they tell people why it is worth it to engage in any deliberate behavior. Their influence on a person's experience toward the focal activity as well as on the behavior's form (Ryan & Deci, 2020) varies, however, as a function of how personally meaningful or autonomous they are; in other words, rationales with a higher compared to lower motivational quality are associated with more desirable well-being and performance-related outcomes. Whereas previous research demonstrates this for receiving rationales (cf. Steingut et al., 2017), these studies were the first, to my knowledge, to experimentally examine the effectiveness of self-generating autonomous rationales for engaging in a boring task. More specifically, across three experimental studies, I examined the impact of self-generating autonomous rationales for engaging in a boring task in addition to receiving either controlling rationales or autonomy support on motivation-related outcomes in two subsequent tasks. Study 1 revealed a significant effect of receiving autonomy support as well as self-generating autonomous rationales in addition to receiving controlling rationales on value/usefulness perceptions and interest/enjoyment toward the initial task (i.e., a boring vigilance task). Moreover, I found partial support for my hypothesis with regard to a subsequent task: Specifically, self-generating autonomous rationales for engaging in the initial task buffered a detrimental carry over effect of controlling rationales and led to sustained performance in the subsequent task. Furthermore, I found that self-generating autonomous rationales was associated with increased interest/enjoyment toward the subsequent task, which indicated a spillover effect.

With two successive studies, I aimed at replicating these findings and extending the original study. Unfortunately, both replication studies were insufficient in drawing comparisons to the original study with regard to the effectiveness of self-generated rationales. In both studies, but particularly in Study 2, intended sample sizes were not fully achieved. In Study 2, I was unable to recruit enough students who were not yet aware of the intentions of the study; Study 3 was conducted in another setting, but I was unable to recruit enough students who met the criteria for inclusion in the dataset (i.e., German as a mother tongue).

Nevertheless, Study 1 and Study 2 confirmed previous studies showing that receiving autonomy support for engaging in a boring task compared to receiving controlling rationales leads to autonomous motivation toward the task (e.g., Deci et al., 1994; Muraven et al., 2008). Contrary to my expectations, I did not find differences between conditions in self-regulatory performance in the initial task. In this regard, irrespective of motivational quality, receiving rationales in general could have sufficed in order for participants of both conditions to show high self-regulatory performance (see Baten, Vansteenkiste, De Muynck, De Poortere, & Desoete, 2020).

Irrespective of conditions, however, correlational analyses revealed a rather consistent pattern of findings across studies, which is in accordance with propositions of self-determination theory and related findings (e.g., Muraven et al., 2008; Muraven et al., 2007; Moller et al., 2006): In each study, value/usefulness perceptions and interest/enjoyment, both features of autonomous motivation, showed a strong positive correlation. Additionally, value/usefulness and interest/enjoyment were in two out of three studies positively correlated with performance in the initial task (cf. Cerasoli et al., 2014). Furthermore, I found that mental fatigue toward the initial task was unrelated to mental fatigue in the subsequent task. As expected, mental fatigue in the Stroop task was positively correlated with Stroop interference.

4.3.4.1 Limitations.

Whereas these studies substantiate, in general, the importance of considering self-generated rationales' motivational quality with regard to motivation related outcomes, there are some noteworthy limitations. First and foremost, the fact that I did not find any difference in the effectiveness of self-generating autonomous rationales in addition to receiving controlling rationales compared to receiving controlling rationales only in both replication studies makes it difficult to state whether related findings from the original study were due to Type 1 error or not. At least with respect to the significant findings regarding Stroop interference, this could be the case, because non-orthogonal planned contrasts inflate the experiment wise (Type 1) error (Field, 2018, chapter 12.4.3). Moreover, effect sizes in the original study were relatively small and the effects could be even smaller than expected. Thus, irrespective of the null-findings in Study 2 and Study 3, the effects found in the original study could still be negligible. Future research should shed light on this, by adapting the instructions to self-generate autonomous rationales.

Another limitation of all three studies are the rather high drop-out rates through application of exclusion criteria. Participants were excluded from further analysis because either they did not show compliance with the instruction to self-generate autonomous rationales and with regard to the vigilance task respectively, and/or because of Stroop task specific exclusion criteria. The instructions could, however, be refined and further examined in future research. In the current research, I addressed these issues by focusing on participants with German as their mother tongue and by making the instruction with regard to the vigilance task more precise (Study 3).

With regard to the vigilance task, it could be assumed that lacking feedback after the practice round led to insufficient compliance (and, thereby, to exclusion), beyond a misunderstanding of the instructions. Typically, studies using the Mackworth clock vigilance task provide feedback after a practice period (cf. Lichstein et al., 2000). However, in my studies

I was not interested in the phenomenon of vigilance and associated performance decrements (see See et al., 1995), but I used the vigilance task for two reasons: First, it is a task of low-interest level that should be susceptible of motivational manipulations (cf. Steingut et al., 2017) and second, it is easy to provide meaningful rationales to engage in it (e.g., because it trains concentration). I was interested in potential carry over effects from the initial to the subsequent task and whether these effects varied as a function of rationales' source and motivational quality. Therefore, to ensure that the participants' effort investment in the vigilance task was held constant between conditions, in each study, I excluded participants who committed errors above a certain threshold (false alarm rate > 5%). Nevertheless, in order to avoid drop-outs, future studies could provide feedback and/or control for effort investment.

4.3.4.2 Future research.

I have following recommendations for future research: First, future studies should refine the instruction to self-generate autonomous rationales in order to make it more effective. Before using an instruction in the scope of following experimental studies, different types of instructions with varying foci on types of motivational regulation (external, introjected, identified, integrated, and intrinsic) could be compared with regard to their effectiveness on motivation-related outcomes. In future research, participants should be prompted to self-generate autonomous rationales with instructions that help to visualize highly self-relevant rationales (Vansteenkiste et al., 2018). Second, I recommend future experimental studies examining the effect of self-generated autonomous rationales to be kept simple: future research could, for example, assess autonomous motivation toward the initial task either during or after the task, but not both. In this regard, findings by Woolley and Fishbach (2015) – which were published after I had conducted the original study – suggest to assess interest/enjoyment during the activity, because people tend to underscore enjoyment when they report it outside the activity. Third, instead of comparing self-generating autonomous rationales with answering irrelevant questions in addition to receiving controlling rationales, future studies could additionally test the difference of self-generating autonomous versus self-generating controlling rationales. This would directly test the hypothesis that, with regard to motivation-related outcomes, increasing motivational quality of a self-generated rationale matters more than increasing motivational quantity; meta-analytic findings show, that this is the case for provided rationales (cf. Steingut et al., 2017).

4.3.4.3 Conclusion.

In sum, my findings substantiate the claim derived from self-determination theory that a rationale's motivational quality affects motivation-related outcomes. Moreover, my findings,

in particular from Study 1, support the idea that adding value to a boring activity, for example by providing or self-generating rationales respectively, maintains the willingness to invest mental effort (Gieseler, Loschelder, Job, & Friese, 2021; Inzlicht et al., 2014; Müller & Apps, 2018) and prevents disengagement (Francis & Inzlicht, 2016; Hopstaken et al., 2015). However, whereas Study 1 initially revealed promising findings with regard to the effectiveness of self-generated autonomous rationales, I was not able to replicate those effects in two subsequent studies. Future research should refine instructions to self-generate autonomous rationales in order to prompt people to visualize highly self-relevant rationales and assure sufficient statistical power.

4.4 Study 4: Self-Generating Autonomous Rationales for Engaging in a Boring Task Facilitates Post-Task Vitality Through Increased Autonomous Motivation.

4.4.1 Introduction

The main purpose of this study is to examine whether self-generating autonomous rationales in instances of controlled motivation enhances autonomous motivation toward the focal task and thereby sustains post-task vitality.

According to self-determination theory, subjective vitality can be defined as the "experience of having positive energy available to or within the regulatory control of one's self" (Ryan & Frederick, 1997, p. 530); it is regarded as an indicator of well-being (e.g., Deci & Ryan, 2008; Ryan & Deci, 2001; Ryan & Frederick, 1997).

Previous research drawing on self-determination theory has shown that 1) providing autonomous rationales for performing a boring task increases autonomous motivation (Muraven et al., 2008; Steingut et al., 2017), and 2) autonomous motivation in contrast to controlled motivation facilitates subjective vitality (Hope, Milyavskaya, Holding, & Koestner, 2016; Nix et al., 1999; for a review see Martela et al., 2016). In their review on the relationship between autonomous motivation and subjective vitality, Martela and colleagues (2016) conclude that engaging in an activity for autonomous, in contrast to controlling reasons, should facilitate vitality; an expectation which Kazén and colleagues (2015) term "invigoration hypothesis".

Currently, there is strong theoretical (e.g., Jang, 2008; Martela et al., 2016; Vansteenkiste et al., 2018) as well as preliminary empirical support (see Study 1; Kazén et al., 2015) for the assumption that in instances of controlled motivation, self-generating autonomous rationales can facilitate autonomous motivation; consequently, I also expect it to support subjective vitality. To my knowledge, however, the current study is the first to examine the effectiveness of self-generated autonomous rationales in instances of controlled motivation on autonomous motivation as well as on the more-distal outcome subjective vitality.

Self-determination theory (Deci & Ryan, 2000; 2008) provides an explanation for the positive relation between autonomous motivation and subjective vitality: It states that in instances of extrinsic motivation either autonomous or controlled motives/reasons regulate the behavior. These reasons differ in how self-determined they are, with more self-determined forms of extrinsic motivation being associated with stronger need fulfillment (e.g., Chen et al., 2015; Sheldon, Ryan, & Reis, 1996; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Vansteenkiste & Ryan, 2013). According to the theory, subjective vitality can be regarded as a consequence of the energizing effect of need satisfaction (Martela et al., 2016; Nix et al., 1999; Ryan & Deci, 2008; Ryan & Frederick, 1997). Correlational as well as experimental

findings substantiate that autonomous relative to controlling reasons for task engagement facilitate need satisfaction and subjective vitality (Ryan & Deci, 2008). For instance, in a group of freshmen students pursuing life goals, those who had more-autonomous rationales reported significantly greater subjective goal-related vitality, compared to those who pursued less-autonomous goals (Hope et al., 2016). In three experimental studies, Nix et al. (1999) manipulated the feelings of autonomy surrounding an activity and thereby induced autonomous (vs. controlled) motivation on participants. Their findings demonstrate that autonomous relative to controlled motivation had a greater effect on the enhancement of subjective vitality. This was also supported by the second experiment of Muraven et al. (2008), who found positive effects on subjective vitality in an autonomy supportive condition relative to a controlling condition. Regarding the effectiveness of self-generated autonomous rationales, however, findings by Kazén et al. (2015) demonstrated that it facilitates invigoration: They found that self-generating autonomous rationales in instances of controlled motivation relative to a control condition was associated with better performance in a difficult task, increments in blood glucose during the experiment, as well as with more fun and ease during a subsequent task.

Expanding on this, the current study examines as to whether prompting people to self-generate autonomous rationales for engaging in a boring task after receiving controlling rationales, in contrast to only receiving controlling rationales, would (1) promote autonomous motivation and self-regulatory performance and (2) sustain post-task vitality via increased autonomous motivation.

Consequently, the current study aims to test two hypotheses. My first hypothesis reads as follows:

Hypothesis 1. After having received controlling rationales for engaging in an uninteresting task, people who additionally self-generate autonomous rationales report greater autonomous motivation toward the task and show better self-regulatory performance in the task, compared to people who additionally describe irrelevant aspects of the task.

Based on theoretical considerations as well as on previous findings (e.g., Kazén et al., 2015; Nix et al., 1999), I argue that self-generating autonomous rationales (vs. no self-generation) for a boring task facilitates post-task vitality through autonomous motivation. Thus, my second hypothesis reads as follows:

Hypothesis 2: After having received controlling rationales for engaging in an uninteresting task, additionally self-generating autonomous rationales, compared to

additionally describing irrelevant aspects of the task, leads to increased autonomous motivation, which in turn leads to heightened subjective vitality.

To test these hypotheses I conducted an experiment using a between-subject design.

4.4.2 Methods

4.4.2.1 Participants.

In total, 155 students from the Technical University of Munich participated in this experiment in exchange for course credit (mean age = 23.87, SD = 3.25; range 19–36; 74 female, 81 male). One-hundred-thirty-two participants indicated German as their mother tongue (i.e., 85.2%). Applying exclusion criteria described in more details below, resulted in a total of 139 participants for which I could conduct further analysis.[27]

4.4.2.2 Procedure.

First, I assessed momentary subjective vitality at the beginning of the experiment (Ryan & Frederick, 1997). As a generic, tedious activity, I employed the computerized version of the Mackworth Clock vigilance task (Lichstein, Riedel, & Richman, 2000). In a vigilance task, self-regulatory success typically decreases over time (i.e., vigilance decrement) due to focused mental effort such as regulating task-irrelevant thoughts or feelings like boredom (e.g., See et al., 1995; Warm et al., 2008). Participants had to concentrate on a red dot jumping from one position to another, arranged in a circle. On a random basis the red dot skipped a position which was the target the participant had to detect and report by pressing the space-bar. Before the trial period, participants (1) were introduced to the vigilance task in a 1-minute practice period (with 3 targets), and (2) were either instructed to self-generate autonomous rationales (rationale condition) or had to answer irrelevant questions (control condition).

As an introduction to the task, participants of both conditions read the following general instruction:

> Pay close attention to the red dot as it moves around the circle.
> The red dot moves from position to position in the circle. You will notice that sometimes the red dot skips a position and jumps over it.
> It is your task to press the spacebar as quickly as possible whenever the red dot jumps over a position.

[27] Running the analyses with German speaking participants only led to the same pattern of results compared to the results including participants with other mother tongues reported below.

In parallel to Study 1, 2 and 3, I induced controlled motivation by using controlling language when instructing the tedious task (see also Deci et al., 1994); in addition to that, I emphasized that participants would receive course credits when performing the task (see Lee et al., 2016). I provided participants with controlling rationales using the following instruction:

> This was the practice round. This is the task you are supposed to work on and assess. You need to press the spacebar as quickly as possible when the red dot skips a position. You will have to work on this task for a few minutes. The end of the task will then be displayed to you. For motivation, once you have worked on and assessed the tasks we have presented, you will receive the participation certificate for the experiment and the associated grade bonus. Continue now and click on 'Next'.

In the control condition (RCR + AIQ), I asked participants to take three minutes to write down what they remembered about the structure of the vigilance task. This time span was equal to the length of time I gave participants in the treatment condition to self-generate autonomous rationales (RCR + SGAR). Here I encouraged participants to consider why performing the vigilance task could be personally meaningful (cf. Canning & Harackiewicz, 2015; Hulleman et al., 2010; Kazén et al., 2015). More specifically, participants were prompted to self-generate autonomous rationales with the following instruction:

> Before starting the task, take about 3 minutes (the time is displayed at the top left). Visualize the task once again. Now try to see this task in as positive a light as possible and find positive things to gain from completing the task (apart from the grade bonus). In what way can you learn/train something by working on this task that could be useful to you personally in your studies/job/personal life? Record your thoughts and the answers to these questions in the text box below in as much detail as possible and in complete sentences.

In order to maintain the saliency of self-generated autonomous rationales subsequent to the manipulation, I then asked all participants how well they remembered what they had written before the trial period. Thereafter, participants started the trial period; they worked for 12 minutes on the vigilance task in which the maximum number of targets was 30. During the task (after 6 minutes), I assessed autonomous motivation and calculated it as the mean of intrinsic and identified ratings from the Situational Motivation Scale (SIMS, Guay, Vallerand, &

Blanchard, 2000). After task completion, I assessed momentary subjective vitality (Ryan & Frederick, 1997) again.

4.4.2.3 Measures

Subjective vitality. To assess subjective vitality before and after the task, participants answered items adapted from the Subjective Vitality Scale (Ryan & Frederick, 1997). The Subjective Vitality Scale is a seven item scale designed to assess individuals' feelings of aliveness and positive energy. As I was interested in participants' situation-specific feeling of vitality, the item "I look forward to each new day" was omitted (cf. Bertrams, Dyllick, Englert, & Krispenz, 2020, p. 70). Thus, participants rated on a seven-point Likert-type scale the following six items: "I don't feel very energetic", "I feel alert and awake", "I feel so alive I just want to burst", "I have energy and spirit", "I feel alive and vital", "I feel energized". Participants used the response scale 1: doesn't correspond at all; 2: corresponds very little; 3: corresponds a little; 4: corresponds moderately; 5: corresponds a lot; 6: corresponds very much; 7: corresponds exactly.

Autonomous motivation. To assess participants' situational autonomous motivation during the vigilance task, I adapted items from the Situational Motivation Scale (SIMS, Guay et al., 2000; see also Muraven et al., 2007). More precisely, I calculated autonomous motivation as the mean of intrinsic motivation and identified regulation ratings. To assess intrinsic motivation, I asked participants to indicate how much the following items correspond to their momentary experience: "I enjoy doing this activity", "I would describe performing this activity as interesting", and "Performing this task is pleasant". To assess identified regulation, participants were asked to indicate how much the following items correspond to their momentary experience: "I believe that performing this task can be important to me", "Performing this task is for my own good", "Performing this task is good for me". Participants used the following response scale: 1: doesn't correspond at all; 2: corresponds very little; 3: corresponds a little; 4: corresponds moderately; 5: corresponds a lot; 6: corresponds very much; 7: corresponds exactly.

In parallel to previous studies, autonomous motivation served as a dependent variable in the current study; regarding this issue, I expected self-generating autonomous rationales, in contrast to answering irrelevant questions, to increase quality of motivation toward the focal task (see Steingut et al., 2017).

For exploratory reasons, the current study assessed controlled motivation and amotivation in addition to autonomous motivation.

Controlled motivation and amotivation. To assess participants' situational controlled motivation and degree of amotivation during the vigilance task, items from the Situational Motivation Scale (SIMS, Guay et al., 2000) were adapted. To assess controlled motivation,

participants were asked to indicate how much the following items correspond to their momentary experience: “I feel that I have to perform the task”, “I am performing the task, because I don’t have any choice”, “I am performing the task, because it is something that I have to do”.

To assess amotivation, participants were asked to indicate how much the following items correspond to their momentary experience: “There may be good reasons to do this activity, but personally I don’t see any“, “I do this activity but I am not sure if it is worth it”, and “I don’t see how this activity can benefit me”. Participants used the following response scale: 1: doesn’t correspond at all; 2: corresponds very little; 3: corresponds a little; 4: corresponds moderately; 5: corresponds a lot; 6: corresponds very much; 7: corresponds exactly.

Self-regulatory performance. In a computerized version of the Mackworth Clock vigilance task (Lichstein et al., 2000), participants had to concentrate on a red dot that jumps clockwise from one position to another. On a random basis, the red dot skipped a position. Participants were instructed to detect and report this kind of event by pressing the space-bar; greater numbers of correct hits (max. 30) indicated self-regulatory performance.

4.4.2.4 Data Diagnostics.

Nine participants showed obvious signs of noncompliance with the instruction to self-generate autonomous rationales and were therefore excluded from the analysis. The frequency distribution of false presses (i.e., false alarms) in the vigilance task was positively skewed: Most participants had no or few false presses, however, some participants had a very large number (cf. Giambra & Quilter, 1989). In order to differentiate false alarms which are attributable to a misunderstanding of the instructions from false alarms which are attributable to self-regulatory failure, I set the following exclusion criterion: false alarm rate (F) less than 5%. Consequently, as there were 1107 trials with a maximum number of 30 correct hits and a maximum number of 1077 false alarms, six further participants with more than 54 false alarms were removed from the dataset. As a result of applying these exclusion criteria, I could conduct the analyses for 139 participants (RCR + SGAR: n = 68; RCR + AIQ: n = 71).

4.4.3 Results

The intercorrelations, means, standard deviations, and reliability coefficients (Chronbach’s α) of the main measures can be seen in Table 10.

Table 10

Study 4: Intercorrelations, Means, Standard Deviations, and Chronbach's α

	Variable	1.	2.	3.	4.	5.	6.
1.	Subjective vitality (before task engagement)	-					
2.	Autonomous Motivation	.18*	-				
3.	Correct hits (self-regulatory performance)	.05	.20*	-			
4.	Subjective vitality (after task completion)	.60**	.45**	.11	-		
5.	Controlled Motivation	-.11	-.29**	-.21*	-.30**	-	
6.	Amotivation	-.17*	-.56**	-.24**	-.33**	46**	-
Mean		3.99	3.12	26.74	3.11	3.96	3.85
SD		1.17	1.13	3.27	1.20	1.62	1.50
Cronbach's *α*		.91	.84		.91	.75	.81

Note. Correlation analyses were conducted including only those participants for whom valid data were available (n = 139).
*p > .05
**p > .01

4.4.3.1 Effects on Dependent Variables.

At the beginning of the experiment, the level of subjective vitality did not differ significantly between conditions (RCR + AIQ: M = 3.89; SD = 1.15; RCR + SGAR: M = 4.12; *SD* = 1.18; t(137) = -1.182, p = .239, *d* = .200); neither did the level of subjective vitality differ significantly between conditions after task completion (RCR + AIQ: M = 2.97; SD = 1.10; RCR + SGAR: M = 3.26; *SD* = 1.29; t(137) = -1.445, p = .151, *d* = .245).

Autonomous motivation during the task. In accordance with my first hypothesis, self-generating autonomous rationales in addition to receiving controlling rationales (RCR + SGAR: M = 3.32; *SD* = 1.15) compared to receiving controlling rationales only (RCR + AIQ: M = 2.93; SD = 1.09), had a significantly larger effect on autonomous motivation toward the otherwise boring task, t(137) = -2.096, p. = .038; it represented an effect of *d* = .356.

Self-regulatory performance. With regard to self-regulatory performance (i.e. correct hits), conditions did not differ significantly (RCR + SGAR: M = 27.24; *SD* = 2.07; RCR + AIQ: M = 26.25; *SD* = 4.09; t(104.58) = -1.798, p = .078, *d* = .301).

4.4.3.2 Indirect effect

To investigate, whether self-generating autonomous rationales in addition to receiving controlling rationales, relative to answering irrelevant questions, has an indirect effect on subjective vitality through increased autonomous motivation, I used regression analysis (Hayes, 2017). As described previously, results indicated that condition was a significant

predictor of autonomous motivation, b = .40, 95% CI [.02, .78], and that autonomous motivation was a significant predictor of subjective vitality after task completion, b = .47, 95% CI [.31, .63]. I used a bootstrap estimation approach with 5000 samples to test the indirect effect (Preacher & Hayes, 2004). The indirect effect was estimated to be b =.19, 95% CI [01, .41] (see Figure 3).

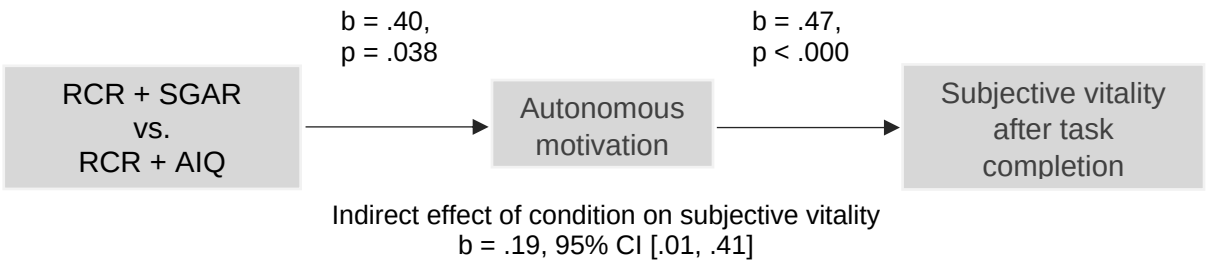

Figure 7. Results from Study 4: Indirect effect of condition (receiving controlling rationales and additionally self-generating autonomous rationales vs. answering irrelevant questions) on subjective vitality after task completion through autonomous motivation.

4.4.3.3 Exploratory findings

Autonomous motivation was positively correlated to performance and post-task vitality. In contrast, controlled motivation and amotivation were negatively related to autonomous motivation, task performance as well as subjective vitality after task completion.

Conditions did not significantly differ with regard to controlled motivation (t(137) = -.545, p. = .587, *d* = .092) or amotivation (t(137) = -1.137, p. = .257, *d* = -.193), respectively.

4.4.4 Discussion

The purpose of this experimental study was to examine as to whether self-generating autonomous rationales for engaging in a boring task in an instance of controlled motivation can facilitate autonomous motivation during the task, task performance as well as (indirectly) subjective vitality after task completion.

The results are consistent with my first hypothesis which states that self-generating autonomous rationales for an uninteresting task compared to answering irrelevant questions enhances autonomous motivation. Furthermore, the current study's results are consistent with the second hypothesis stating that self-generating autonomous rationales exerts its effect on post-task subjective vitality indirectly through autonomous motivation.

Thus, with this study, I essentially replicated findings from Study 1 which demonstrated positive effects of self-generating autonomous rationales on value/usefulness perceptions and interest/enjoyment, both indicators of autonomous motivation. Moreover, the current study

supports findings from previous experimental studies demonstrating invigorating effects of self-motivation (e.g., Kazén et al., 2015). More specifically, the current findings support the assumption that in instances of controlled motivation, self-generating autonomous rationales for engaging in a boring task can facilitate the quality of motivation toward the focal task and, thereby, helps to sustain subjective vitality after task completion. Thus, whereas levels of controlled motivation were equally high in both conditions, successfully self-generating autonomous rationales helped to sustain subjective post-task vitality. This finding indicates that several reasons can simultaneously regulate behavior and emphasizes the importance of taking the reasons' motivation quality into account when examining their impact (see for example Howard et al., 2016; Howard & Gagné, 2017).

However, other than expected, I did not find an effect on performance between conditions. This absence of group difference on the performance measure could theoretically also indicate a Hawthorne effect, an impact on behavior due to research participation and the consequent awareness of being studied (Parsons, 1974). However, as McCambridge, Witton, and Elbourne (2014) show in their review, little is known to date about the size of the effect, its conditions, and the underlying mechanisms. Furthermore, that differences in motivational quality affect performance was revealed by Steingut et al. (2017) in their meta-analysis. In line with predictions by self-determination theory (e.g., Ryan & Deci, 2008), across conditions increased autonomous motivation was positively and controlled motivation negatively associated with performance. I have two possible explanations for my null-finding: First, the amount of time participants working on the vigilance task may have been too short for differences in performance to manifest; in studies examining performance decrements in the course of the task, participants typically work on it for 20 to 60 minutes (Lichstein et al., 2000; See et al., 1995). However, performance decrements are typically expected to occur relatively early (cf. See et al., 1995). Second, with respect to the fact that the vigilance task is fairly easy to perform, it could also be that a high expectation to perform well in both conditions is sufficient to yield to a rather high performance, regardless of motivational quality.

4.4.4.1 Theoretical and Practical Implications

The present study is one of the first to apply self-determination theory to processes of self-motivation (see also Study 1 and Kazén et al., 2015) instead of socio-environmental influences that induce motivation. The findings of the current study demonstrate once again, that people can effectively self-generate autonomous rationales in instances of controlled motivation. More specifically, they show that self-generating autonomous rationales can facilitate autonomous motivation and that its effect on subjective vitality is transmitted through autonomous motivation. Finding this indirect effect is in line with expectations of self-

determination theory: Self-generating autonomous rationales is only expected to be effective on subjective vitality when it results in increased autonomous motivation, because the latter corresponds to an increased satisfaction of psychological needs (cf., for example, Vansteenkiste et al., 2018), which causes feelings of vitality (e.g., Ryan & Frederick, 1997).

However, in terms of self-determination theory, increases in autonomous motivation indicate an internalization process (see for example Vansteenkiste et al., 2010) which "represents the active assimilation of behavioral regulations that are originally alien or extemal to the self" (Ryan, 1995, p. 304). Accordingly, I argue that a self-deployed internalization process serves as an explanation for how self-generating autonomous rationales in instances of controlled motivation yields its positive motivation-related effects.

Beyond this, however, my findings suggest that some outcomes (i.e., subjective vitality) might be more strongly influenced by increases in rationales' motivational quality than others (i.e., performance on an easy task). In fact, this is in line with findings from a previously published meta-analysis (Van den Broek, Howard, Van Vaerenbergh, Leroy, & Gagné, 2021) which demonstrates that intrinsic compared to identified regulation is more important with regard to well-being-related outcomes, and identified regulation (a form of autonomous motivation) as well as introjection (a form of controlled motivation) can both have positive effects on performance.

As increases in autonomous motivation, in contrast to controlled motivation, are associated with increased internalization in general (e.g., Deci, & Ryan, 2008) and subjective vitality in particular, which is an indicator of well-being (Ryan & Deci, 2001; Ryan & Frederick, 1997), my findings have health-related implications. Specifically, my findings have implications for the educational as well as the work context, where controlled motivation and lacking interest is ubiquitous (cf., Gallup, 2023; Lepper et al., 2005; Skinner et al., 2008): Students/employees can increase their autonomous motivation and with it their feelings of vitality by learning how to self-generate invigorating autonomous rationales.

4.4.4.2 Limitations and Future Research.

There are some limitations to the current experimental study. First, as in the previous three studies, I had rather high drop-out rates in the vigilance task of this study; this was mainly because I excluded participants who committed errors above a certain threshold (false alarm rate > 5%). Herewith, I assured that the participants' effort investment in the vigilance task was held constant between conditions. Nevertheless, in order to keep drop-out rate low, future studies could provide feedback and/or assess subjective effort investment as a control variable. Second, although the instruction that prompted participants to self-generate autonomous rationales appeared to be effective in the current study, these findings should be

replicated, because I did not find effects in previous similar studies (Study 2 and Study 3). I point out, however, that the instruction was similar but slightly different to the instruction used in Study 1, 2 and 3: Whereas in Study 1, 2 and 3 participants had to answer the rather abstract question as to what extent they could "personally benefit from carrying out this specific task", participants in the current study received a more precise question as to what extent they could "learn/train something by working on this task that could be useful to [them] personally in [their] studies/job/personal life". In future studies, instructions could prompt participants to self-generate autonomous rationales focusing on varying forms of motivational regulation and compare their effects; in this regard I recommend to also include an instruction focusing on interest/enjoyment, which could be even more effective, as it should lead to more-internalized motivational regulation (Ryan & Deci, 2020; Vansteenkiste et al., 2018). Third, the manipulation to self-generate additional rationales used in this study may have contributed to participants' creation of concrete mental images. Regarding this issue, findings from research on goal imagery (Schultheiss & Brunstein, 1999; see also Job & Brandstätter, 2009) and visionary images (Rawolle, Schultheiss, Strasser, & Kehr, 2017) demonstrate that the mental image of a goal state can arouse implicit motives, or in other words, facilitate the involvement of needs, and thereby elicit motivation. Thus, the current findings can be explained either by mental imagery and arousal of implicit motives or by self-generated autonomous rationales and the activity's internalization. Future studies could address that distinction. However, the visualization of the activity in connection with mental images appears as a possible result when self-generating autonomous rationales; compared to manipulations suggesting a less pictorial visualization (e.g., manipulation in Study 1), the manipulation in the current study should be more effective because it fosters a more pictorial visualization and, thereby, increases the likelihood that the activity will be related to psychological needs (cf. Job & Brandstätter, 2009; Rawolle et al., 2017). Fourth, in the current study I assessed autonomous motivation as an indicator for internalization and, thus, need-satisfaction; however, autonomous motivation is a rather distal measure of need-satisfaction. Moreover, researchers have only recently discussed that full-internalization requires the satisfaction of all three needs: autonomy, relatedness and competence (see Vansteenkiste et al., 2020). Consequently, I recommend that future studies assesses need satisfaction more directly, for example by using the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015); furthermore, researchers could evaluate whether self-generating autonomous rationales is actually more effective regarding more-distal outcomes such as subjective vitality when people relate the focal activity to more psychological needs.

However, the world is a lot more complicated than a laboratory, and instances of insufficient motivation are a lot more sophisticated than a boring computerized vigilance task. Thus, future research should examine the potential impact of self-generating autonomous

rationales in instances of insufficient motivation outside the laboratory, as people deal with insufficient motivation in their daily lives.

4.4.4.3 Conclusion.

This is the second randomized experiment demonstrating that self-generating autonomous rationales in instances of controlled motivation can facilitate autonomous motivation toward a boring task. It expands on previous research (e.g., Study 1) by showing that when self-generated autonomous rationales increase autonomous motivation toward the focal activity, it also has an indirect effect on more-distal outcomes such as subjective vitality.

With regard to future research, I recommend to look at activities in the real world to understand what effect self-generating autonomous rationales can have in instances of insufficient motivation in everyday life.

4.5 Study 5: Does Self-Generating Autonomous Rationales Help to Adapt to Aversive Activities in Everyday Life? – An Experience Sampling Study

Whether we like it or not, on an everyday basis (Hennecke et al., 2019), we have to engage in activities we do not particularly like to do or even find aversive. For some of us this may relate to emptying the dish washer, for others it is going to the gym, studying for an exam, or collaborating on a project with a disliked colleague. Nonetheless, engaging in such aversive activities is often inevitable, if we want to achieve short-term (e.g., clean flat) or long-term goals (e.g., graduating from university), or live up to environmental constraints (e.g., the longed-for promotion will only be possible if the project is successfully completed). But will our motivation, and with it our experience and behavior, change, when we discover personally meaningful rationales for engaging in such daily aversive activities? The purpose of this study is to examine whether self-generating autonomous rationales for engaging in everyday aversive activities can help to positively adapt to those activities.

Regarding this issue, self-determination theory (e.g., Ryan & Deci, 2000) suggests that when people engage in activities they find aversive, controlling rationales regulate behavior. Such rationales are associated with feelings of “having to do something”; this is in contrast to autonomous rationales for activity engagement, where people are guided by a sense of value and view the focal activity as worthwhile. Based on their different influence on a person's experience and behavior (see Steingut et al., 2017; Vansteenkiste et al., 2018), the theory speaks of low-quality rationales in the case of controlling rationales and high-quality rationales in the case of autonomous rationales. In accordance, motivational quality determines the experience and behavior toward the focal activity. In this regard, research shows, for example, that more-autonomous rationales relative to less-autonomous rationales have stronger positive effects and are more-likely to lead to adaptive outcomes compared to controlling rationales (e.g., Howard et al., 2016; Ntoumanis et al., 2014; Steingut et al., 2017).

Therefore, I propose, that self-generating autonomous rationales for engaging in aversive activities should facilitate adaptive outcomes. More specifically, in the current experience sampling study, I scrutinize the effect of self-generating autonomous rationales for engaging in aversive activities in instances of controlled motivation on subjective ease and self-regulatory success. Previous research substantiates my predictions as it shows that people who have autonomous relative to controlling rationales for pursuing a goal, experience less inner hindrances (Milyavskaya et al., 2015) and as a consequence, pursuing more-autonomously-motivated goals is perceived as easier compared to controlling goals (Werner et al., 2016). Building on these findings, I expect that self-generating more-autonomous rationales also has stronger positive effects on subjective ease and feelings of effortlessness toward aversive activities. Research furthermore suggests that when people self-generate

autonomous compared to controlling rationales for engaging in an aversive activity, the likelihood of successful self-regulation should increase (e.g., Critcher & Ferguson, 2016; Kazén et al., 2015; Vansteenkiste et al., 2009). More specifically, previous research shows that the more personal meaningfulness people perceive in activities, the greater their goal progress (e.g., Werner et al., 2016), and performance (e.g., Canning & Harackiewicz, 2015; Kazén et al., 2015). Therefore, my hypotheses read as follows:

Hypothesis 1a (between-participants): Self-generating autonomous rationales for engaging in an aversive activity (i.e., self-generated rationale condition), relative to describing irrelevant facts of the situation (control condition), has a positive effect on subjective ease and subjective self-regulatory success.

Hypothesis 1b (within-participants): People experience greater subjective ease and subjective self-regulatory success in aversive activities for which they identified a more-autonomous (vs. less-autonomous) rationale.

Previous research has furthermore documented positive associations between pursuing personally meaningful (i.e., autonomous) goals and outcomes associated with well-being in various life domains. This applies, for example, to subjective vitality, representing “the positive feeling of having energy available to the self” (Nix et al., 1999, p. 266), and satisfaction (see Hope et al., 2016; Martela et al., 2016; Ryan & Deci, 2008; Sebire, Sandage, & Vansteenkiste, 2009; Neyrinck, Vansteenkiste, Lens, Duriez, & Hutsebaut, 2007).

In line with these findings, I expect that people who self-generate autonomous rationales for initially aversive activities in the course of a day, will report higher levels of vitality and satisfaction at the end of the day, compared to people who do not self-generate autonomous rationales in such instances.

Hypothesis 2 (between-participants): Self-generating autonomous rationales for engaging in aversive activities during the day (i.e., rationale condition), relative to describing irrelevant facts of the situation (i.e., control condition), has a positive effect on subjective vitality and satisfaction.

To my knowledge, this is the first experience sampling study examining the effectiveness of self-generating autonomous rationales in everyday life. The design of the present research is oriented on a study of Fishbach and Hofmann (2015). Given the novelty of this research question and the difficulties involved in calculating sample sizes for studies with many repeated measures (e.g., Kreft & de Leeuw, 1998; Scherbaum & Ferreter, 2009), I based my recruitment

goal on sample sizes in studies with similar designs and research questions (e.g., Fishbach & Hofmann, 2015; Pogrebtsova, Craig, Chris, O'Shea, & Gonzalez-Morales, 2018). In these studies final sample sizes varied between Ns of 95 and 106. I aimed at recruiting 120 participants with a minimum response rate of 70%, so I attempted over-recruit an original sample of 150 participants. I preregistered this study on the Open Science Framework (https://osf.io/dsz4f).

4.5.1 Method

4.5.1.1 Participants

Participants were 143 adults (mean age = 24.1, SD = 7.8; range 18–68; 53 female, 87 male, 1 diverse). As I recruited participants from the participants' pool of the TUM's laboratory for experimental research in economics, 72.3% of the participants were students and 27.7% were employees at the Technical University Munich. Regarding language skills, 78.7% of participants indicated German as their mother tongue, whereas the rest of the participants indicated C1-level and C2-level respectively. Participants received 6€ as base compensation for coming to the orientation meeting, 1 € for each completed daily survey and 2€ for each completed nightly diary. In total, participants could earn up to 36€ for responding to all signals (cf. Fishbach & Hofmann, 2015). The application of exclusion criteria, described in more detail below, resulted in a total of 137 participants for which I could conduct progress-related analyses.

4.5.1.2 Procedure

I asked for participants' end-of-day assessment of how they experienced their engagement in daily aversive activities over a period of 5 days, using experience-sampling methodology (Csikszentmihalyi & Larson, 1987). In each instance of experience sampling, participants reported on an aversive activity that they would engage in during the next 3 to 4 hours (four activities on each day). At the end of the day, they indicated their experience with these activities as well as their current subjective vitality and satisfaction with the day (i.e., nightly diary). I manipulated between participants whether participants answered irrelevant questions (control condition) or self-generated autonomous rationales for engaging in the aversive activity (rationale condition).

The study consisted of three parts: (1) A laboratory-based session for an orientation meeting, (2) the experience sampling phase, and (3) a laboratory session for payment and debriefing. At the orientation meeting, a trained experimenter informed the participants about the general purpose of the study and the procedure during the experience sampling phase,

providing both oral and written instructions. Thereafter, participants downloaded Pocket Report[28], an experience sampling app running on iOS and Android, onto their own smartphone. Hereby, they were assigned randomly to the control or the self-generating autonomous rationales condition; they were, however, unaware of the two different conditions. Participants received detailed instructions for using Pocket Report and had a chance to practice answering the experience sampling survey by reporting their socio-demographics and to ask clarification questions.

4.5.1.3 Experience Sampling Records

In the experience-sampling phase, I distributed four daily signals via the smartphone app pocket report between 8:00 a.m. and 9:30 p.m on five consecutive days (Monday till Friday). Each day, participants received a signal at the beginning of four consecutive blocks, covering four sections of a day. These blocks were as follows: 8:00 –12:00 a.m (morning/ forenoon), 12:00 a.m.–3:00 p.m (noon), 3:00–6:00 p.m (afternoon), and 6:00 –09:30 p.m. (evening). Each day, at 09:30 p.m, participants received a nightly diary on their smartphone.

I instructed participants to respond to a brief activity survey as soon as possible after receiving each daily signal. In each survey, I first asked participants to report on an activity using the following instruction: “In the text field below, please write down an activity that you feel you must or should do this morning before 12:00 noon / between 12:00 noon and 3:00 p.m. / between 3:00 and 6:00 p.m. / between 6:00 and 10:00 p.m., but for which you have little or no desire and which you will find rather unpleasant“.

Next, participants were asked to indicate how unpleasant they expect to find the anticipated aversive activity overall on a 4-point scale featuring the gradations ‘slightly unpleasant’, ‘somewhat unpleasant’, ‘very unpleasant’, ‘extremely unpleasant’.

Then, participants classified the activity according to activity domain with the help of 13 multiple choice categories: academic/work, relationship, social, health/fitness, financial, pleasure, leisure, hobby, spiritual, activism, emotion management, maintenance, other (Fishbach & Hofmann, 2015; Hofmann, Finkel, & Fitzsimons, 2015).

Thereafter, depending on the condition participants were assigned to, they were either prompted to self-generate an autonomous rationale (i.e., rationale condition) or to answer irrelevant questions (i.e., control condition).

In the rationale condition, participants noted their rationales in a text-entry window provided below the instruction. The following instruction was intended to help participants to self-generate autonomous rationales for engaging in the aversive activity:

[28] For more information on the app Pocket Report see Appendix.

Take a moment and visualize the activity once again.
Think about your rationale for engaging in this activity. Instead of looking for a reason that might be important to others, try to find a reason that is relevant to you personally.
What reason do you see for yourself to engage in this activity?
Note the reason in the text box below.

In the control condition, participants received irrelevant questions. Then read the following instructions:

Take a moment and visualize the activity once again.
Now list some characteristics of the situation in which you will perform the activity (e.g. place, people who will be around you, expected time when you will perform the activity, etc.)
What are the characteristics of the situation in which you will be engaged in the activity?
Record the characteristics of the situation in the text box below.

After participants had noted their thoughts, I assessed the motivational quality of the reasons to engage in the activity visualized. Regarding this, I prompted participants with the following: "Visualize once again why you are likely to engage in this activity. There are always reasons that motivate us to pursue activities. Please help us to better understand your [just mentioned] reason for doing this job." To assess the motivational quality of reasons, I then used four adapted items from Milyavskaya et al. (2015), which were presented in random order with the primer "The [just mentioned] reason…". Participants could answer the items: "…reflects who I am and what I value most in life." (integrated), "…is really important to me." (identified), "…has to do with the feeling that I ought to engage in the activity" (introjected), and "…shows that somebody else wants me to engage in it, or I will get something from somebody if I do.'' (external), on a scale from 1 (does not apply at all) to 6 (applies entirely). Table 11 gives an overview of the experience sampling intervention design as well as variables.

Each day, at 9:30 p.m., participants received a nightly diary on the Pocket Report app. In the nightly diary, I asked participants to execute activity specific assessments for each activity listed earlier that day. Activity initiation was assessed as a binary variable (0 = activity not initiated, 1 = activity initiated). With regard to their experience toward each activity, I first asked participants about the extent to which they found pursuing the activity to be easy (see Milyavskaya et al., 2015; Werner et al., 2016); here, participants answered the item "How

effortless did it feel for you to pursue this activity?" on a scale from 1 (not at all effortless) to 6 (entirely effortless).

Table 11

Study 5: Overview of the Experience-Sampling Intervention Design

	Rationale condition (R)	**Control condition (C)**
4 daily activity assessments	Degree of Aversion Activity Classification *Self-generating rationales instruction* Motivational quality of reason(s) to engage in the activity	Degree of Aversion Activity Classification *Irrelevant questions* Motivational quality of reason(s) to engage in the activity
Nightly diary	Subjective ease Subjective self-regulatory success End of day vitality End of day satisfaction Spontaneous self-generation of autonomous rationales	Subjective ease Subjective self-regulatory success End of day vitality End of day satisfaction Spontaneous self-generation of autonomous rationales

Second, I assessed perceived self-regulatory success with respect to each activity (see Hennecke et al., in press). Here I asked participants about how satisfied they were with how long they had persisted in the activity on a scale from 1 (not satisfied at all) to 6 (absolutely satisfied).

After the activity-specific assessment, participants provided a daily summary measure of their subjective vitality and satisfaction with completing tasks and achieving goals. To measure a daily summary of their subjective vitality, I asked: "All in all, how energetic do you feel at the end of the day?"; participants answered on a scale from 0 (not at all energetic) to 6 (very energetic). I then assessed a daily summary of their subjective satisfaction completing tasks and achieving goals, using a scale from 0 (not satisfied at all) to 6 (very satisfied).

Finally, I asked participants if they spontaneously had self-generated rationales in the course of the day. In order to capture how often during the day participants spontaneously tried to connect aversive activities with autonomous reasons, I used a scale from 1 (to a very small extent) to 6 (to a very large extent).

4.5.2 Results

4.5.2.1 Data Analytic Procedure

I conducted all analyses through Multilevel modeling (Hox, Moerbeek, & van de Schoot, 2018) using R (Peugh, 2010), because my data are nested (observations within persons). As I asked participants the same questions several times to self-assigned aversive activities, the

Level 1 unit of analysis is activities. The Level 2 unit of analysis is persons; hence, I treat the between participants condition assignment as a Level 2 factor. Intraclass correlations (ICCs) are displayed in all Tables; stronger ICCs correspond to smaller within-person variability, which indicates larger between-person variability. I ran the treatment condition as a between-participants factor (self-generating rationales condition vs. control condition). In other words, multilevel regression results predict self-regulatory success in aversive activities as a function of condition (0 = control; 1 = self-generating rationales). All models included random effects for the intercept only, as models also including random slopes either did not converge or did not improve the model fit; in cases where condition was the predictor random slopes models were not practical, because condition is a constant variable. Note that at any given occasion, activity initiation was assessed as a binary variable (0 = activity not initiated, 1 = activity initiated); therefore, in the analyses predicting activity initiation, I applied logistic multilevel regression analyses provided by the 'glmer' function.

4.5.2.2 Response Rate, Response Delay, Completion Rate

Overall, participants responded on a total of 2,478 signals during the daily part of the experience-sampling phase (i.e., 87.9% response rate). On 43.1% of occasions (1067) participants indicated that an aversive activity was coming up for them soon. Participants completed a total of 639 nightly diaries (response rate: 91.3%); with this, information on actual daily activity engagement could be collected for a total of 999 aversive activities (93.6% of all aversive activities provided). Participants actually engaged in 83.2% of their reported aversive activities (831).

Due to technical problems, participants were allowed to respond to each signal until the consecutive signal. Thus, to ensure that I only analyzed progress on aversive activities which were provided in the beginning of each block during the day, for further analyses, I filtered the dataset for activities which were reported maximum 1 hour after each during-the-day signal and 2.5 hours after the nightly diary signal. In terms of response delay, the median response time to signals during the day was 9.0 min. In other words, participants responded to more than 50% of all answered signals within just 10 min of me dispatching those signals. Participants responded to more than 50% of all answered nightly diaries within just 12.9 min of me dispatching those signals. Regarding completion rate, all surveys that had been started were indeed completed.

4.5.2.3 Activity Domains and Level of Aversiveness/Unpleasantness

What types of everyday aversive activities did people report? Participants mentioned activity domains with the following frequency in descending order: academic/work (781;

73.2%), maintenance (117; 11%), health/fitness (81; 7.6%), social (54; 5.1%), financial (49; 4.6%), other (24; 2.3%), hobby (15; 1.4%), leisure (15; 1.4%), pleasure (15; 1.4%), activism (13; 1.2%), emotion management (10; 0.9%), and relationships (8; 0.7%). No aversive activity was reported with regard to the domain spirituality; because participants were able to check more than one category per activity, these percentages add up to more than 100% (n= 1182). As intended, the overall level of unpleasantness across activities was rather high (M = 2.23, SD = .77, intraclass correlation coefficient (ICC) = .22). The greatest unpleasantness was reported for ‘other activities’, followed by ‘relationship to partner’, ‘academic/work’, ‘financial’, and ‘maintenance’.

4.5.2.4 Data Preparation

Two participants did not provide any aversive activity; in accordance with exclusion criteria, they were therefore excluded from analysis. Exclusion criteria also concerned occasions with obvious signs of noncompliance with instructions: One participant showed obvious signs of noncompliance with instructions in 15 of 17 and another participant in six of six occasions; therefore, both participants were excluded from analysis. Moreover, because in 11 occasions, participants did not show compliance with instructions, these occasions were excluded from further analysis. Lastly, to ensure that I would examine the effect of self-generated autonomous rationales with respect to activities that are truly aversive, I excluded all activities with an aversion of 1 (i.e., “slightly unpleasant”) from further analysis (14.5%). As a result of applying these exclusion criteria, a total of 17.3% of responses were excluded from further analyses, leaving data from 137 participants.

The overall number of aversive activities (unpleasantness > 1) for which progress information was available was 816. In the nightly diary, participants reported that they actually engaged in 83% of these aversive activities (677). As described previously, due to necessary trimming procedures with regard to the response delay, I could eventually conduct progress-related analyses of 648 aversive activities with participants engaging in 543 of those activities (83.8%).

The intercorrelations, means and standard deviations of my main experience-sampling measures can be seen in Table 12.

Table 12

Study 5: Means, Standard Deviations, and Intercorrelations for Study Variables at the Person Level

	Variable	1.	2.	3.	4.	5.	6.
1.	Motivational quality of rationale(s) for activity engagement (MQofR)	-					
2.	Subjective ease	.11*	-				
3.	Self-regulatory success	.13**	.28**	-			
4.	End of day vitality	.13**	.19**	.24**	-		
5.	End of day satisfaction	.17**	.21**	.51**	.45**	-	
6.	Condition	.22**	.01	.10*	.11**	.13**	-
Mean		3.41	2.79	3.86	2.88	3.54	-
SD		1.37	1.56	1.59	1.63	1.59	-

Note. Correlation analyses were conducted at the person level (i.e., aggregating lower-level measurements of motivational quality of reason(s) to engage in the activity, activity initiation, subjective ease during activity engagement, subjective self-regulatory success, end of day vitality, and end of day satisfaction), including only those participants for whom valid progress data were available (n = 137).
*p < .05
**p < .01

4.5.2.5 Manipulation check

Motivational quality of rationale(s) served as a manipulation check. Manipulation was succesfull when motivational quality of rationales significantly differed between conditions. The ICC was .43, which indicates that approximately 57% of the variance in motivational quality of rationales was between-activities (within-person). I found that conditions significantly differed in motivational quality of rationales: Participants who were asked to self-generate autonomous rationales, compared to participants who answered irrelevant questions, indicated significantly higher motivational quality of rationales, see Table 13. Therefore, I concluded that the manipulation was succesful.

Table 13

Study 5: Influence of Condition on Motivational Quality of Rationales, MQofR (Multilevel Linear Regression)

	MQofR					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	3.127	.127	24.535	.000	2.877	3.378
Condition	**.542**	.179	3.028	.003	.188	.896

ICC: MQofR: .43

Note. Significant B is printed in bold (except for significant intercepts). CI, confidence interval; ICC, intraclass correlation coefficient.

4.5.2.6 Treatment effects (testing H1a)

Next, I analyzed the effectiveness of self-generating autonomous rationales relative to answering irrelevant questions (H1a); therefore I ran multilevel regression analyses that involved the two conditions, self-generating rationales versus irrelevant questions, as a between factor. I found no effect of condition on activity initiation, subjective ease or subjective self-regulatory success with regard to the indicated activities (see Table 14). The ICCs – displayed at the bottom of the table – denote the intraclass correlation, which show how strongly observations within the same person resemble each other. I see for example that the ICC for subjective ease in daily aversive activities (.16) is lower than for subjective self-regulatory success (0.25); this means that observations in the variable subjective ease within one person are less similar than observations in the variable self-regulatory success within one person.

Table 14

Study 5: Influence of Condition on Subjective Ease and Subjective Self-regulatory Success

	Subjective Ease					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	2.797	.128	21.905	.000	2.546	3.048
Condition	.016	.178	.088	.930	-.337	.368
	Subjective Self-regulatory Success					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	3.806	.141	26.961	.000	3.528	4.084
Condition	.169	.197	.857	.393	-.221	.558

ICC: Activity initiation: .25, Subjective Ease: .16, Subjective Self-regulatory Success: .25

Note. Significant B_{log} and B are printed in bold (except for significant intercepts). CI, confidence interval; ICC, intraclass correlation coefficient.

4.5.2.7 Effects of Motivational Quality of Rationales (H1b)

Thereafter, I tested the effects of motivational quality of rationales on activity initiation, subjective ease and subjective self-regulatory success. In support of my hypothesis, I found that when participants indicated more-autonomous rationales for engaging in aversive activities, they reported more subjective ease and more self-regulatory success with regard to these activities (see Table 15).

Table 15

Study 5: Influence of Motivational Quality of Rationales (MQofR) on Subjective Ease and Subjective

	Subjective Ease					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	2.396	.205	11.697	.000	1.994	2.799
MQofR	**.119**	.054	2.203	.028	.013	.225

	Subjective Self-regulatory Success					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	3.439	.211	16.319	.000	3.025	3.853
MQofR	**.133**	.055	2.427	.016	.025	.240

ICC: Activity initiation: .25, Subjective Ease: .16, Subjective Self-regulatory Success: .26

Note. Significant B_{log} and B are printed in bold (except for significant intercepts). CI, confidence interval; ICC, intraclass correlation coefficient.

4.5.2.8 Downstream Effects on Daily Satisfaction and Vitality (testing H2)

I ran a multilevel analysis of vitality/satisfaction, assessed with the nightly diary and expected that average daily vitality/satisfaction, assessed at the end of the day, significantly differs between conditions. In contrast to my hypothesis, a multilevel analysis of vitality and satisfaction, did not show a significant overall effect between conditions. Participants who were instructed to self-generate autonomous rationales for engaging in aversive activities reported as much vitality/satisfaction as participants who did not receive this instruction (see Table 16).

Table 16

Study 5: Influence of Condition on End of Day Vitality and Satisfaction (Multilevel Linear Regression)

	Vitality					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	2.819	.159	17.729	.000	2.507	3.132
Condition	.250	.223	1.118	.266	-.192	.691

	Satisfaction					
					CI_{95}	
Fixed effects	B	*(SE)*	*t*	*p*	Lower	Upper
Intercept	3.455	.167	20.658	.000	3.126	3.783
Condition	.306	.235	1.304	.197	-.159	.771

ICC: Satisfaction: .56, Vitality: .44

Note: Significant B are printed in bold (except for significant intercepts). CI, confidence interval; ICC, intraclass correlation coefficient.

4.5.2.9 Exploratory Analysis

For exploratory reasons, I tested whether participants in the self-generating rationale condition, relative to participants in the control condition, spontaneously self-generated rationales during a day more often (ICC = .48). In this regard, I did not find differences between conditions, *B* = -.063, *SE* = 0.230, 95% CI (-.518, .392), *t* = -.275, *p* = .784. Moreover, spontaneous self-generation of rationales did not significantly influence any other variable assessed.

4.5.3 Discussion

In the course of daily as well as long-term goal pursuit, we occasionally find ourselves obliged to engage in unpleasant, rather aversive activities. The purpose of the present experience sampling study was to examine the effect of self-generating personally meaningful (autonomous) rationales for engaging in aversive activities, people feel they have to perform, on motivation-related outcomes. From a self-determination theory perspective (Ryan & Deci, 2000), self-generating autonomous rationales in instances of "have-to" (i.e., controlled) motivation should prevent detrimental effects and facilitate adaptation. To my knowledge this is the first experience sampling study examining the short-term effectiveness of self-generating autonomous rationales on motivation-related outcomes with regard to everyday aversive activities.

In this study, I based my hypotheses on principals of self-determination theory (e.g., Ryan & Deci, 2000, 2020) and related empirical findings (e.g., Steingut et al., 2017). In support of my hypotheses, I found across conditions that having rationales of higher motivational quality for engaging in an aversive activity during the day was positively associated with subjective ease as well as subjective self-regulatory success toward the activity reported at the end of the day (cf. Gillet et al., 2017; Howard et al., 2016; Howard & Gagné; 2017; Steingut et al., 2017). Moreover, I found that self-generating autonomous rationales, relative to answering irrelevant questions, was associated with reporting rationales of higher motivational quality (i.e., more-autonomous). In contrast to my hypotheses, however, I did not find significant differences between conditions: Neither people who were prompted to self-generate autonomous rationales for engaging in an upcoming aversive activity nor people who had to answer irrelevant questions reported greater ease or greater subjective self-regulatory success with regard to the activity. Furthermore, neither of those two groups reported greater end of day vitality or satisfaction. When I compare these results with the correlational findings (see Table 12), it shows that most significant correlational findings were due to random variation. This demonstrates the importance of taking – in general as well as with regard to this specific

study – the clustering into account and conducting multilevel analyses (see, for example, Ciarrochi, Hayes, Oades, & Hofmann, 2022).

Moreover, the findings of the current study add to previous experience sampling research drawing on self-determination theory (e.g., Ketonen et al., 2018; Milyavskaya et al., 2015; Milyavskaya & Inzlicht, 2017) and indicate that the principles of self-determination theory operate for short-range every day activities as well. As in the current study, I specifically asked for aversive "have-to" activities; these findings furthermore show that behavior can be multiply motivated, controlled as well as autonomous simultaneously (see Howard et al., 2016): In accordance with other findings drawing on self-determination theory, I found that despite an activity being expected to feel aversive, people still wanted to (and did) engage in it, when they had personally meaningful reasons to do so (see Werner & Milyavskaya, 2019; see also Sheldon & Elliot, 1998). In this regard, multilevel regression analysis revealed that the more-autonomous a rationale for engaging in an upcoming aversive activity was, the more ease a person experienced during activity engagement, which is in line with previous research on ease in goal progress (e.g., Werner et al., 2016). The association of having more-autonomous rationales with greater subjective self-regulatory success is in line with my predictions as well as with previous findings from experimental studies in the lab (e.g., Kazén et al., 2015).

However, my null-findings with regard to the two conditions, self-generating autonomous rationales versus answering irrelevant question, are puzzling. As I will discuss below, this could be (at least in part) attributed to methodological reasons. Beyond such methodological limitations, however, recently published research (Van den Broek et al., 2021) questions my initial understanding implicitly underlying this study, namely, that self-generating rationales should be beneficial for every person, regardless of the activities' domain or characteristics.

4.5.3.1 Limitations and Future Directions

Despite the novel contribution to the literature, examining the effectiveness of self-generated rationales and using experience sampling method, there are some limitations that should be highlighted.

Whereas I found that having more-autonomous rationales for engaging in aversive activities facilitates adaptation, I did not find significant differences between conditions in activity-related outcomes assessed at the end of the day. Regarding this issue, it is possible that the way in which I prompted participants to self-generate autonomous rationales was, relatively speaking, not effective enough to manifest in psychological and behavioral outcomes. However, my manipulation check revealed that the manipulation led to significant differences in motivational quality of reported rationales between conditions, which should be crucial for more-distal outcomes. However, previous experimental lab studies (see Study 1 and

Study 4) indicated rather small effects; thus, the effect might be too small in real life. Considering findings from Study 4, an alternative explanation could furthermore be that there is only an indirect effect of self-generating autonomous rationales on more-distal outcomes such as vitality transmitted through increased autonomous motivation. As I did not assess autonomous motivation, I recommend that future research using the experience sampling method investigates an indirect effect on the outcomes of interest transmitted through autonomous motivation.

Moreover, methodological shortcomings could limit the interpretation of my results. Crucially, in this study, I asked participants to self-generate rationales for upcoming aversive activities. Thus, the design of the current study does not allow to assess whether the self-generated rationale actually regulated the person's behavior during the aversive activity. Consequently, it is possible that participants in this condition visualized autonomous rationales in accordance with my instructions, but then finally fell back to the initial, most likely less-autonomous, rationales. In an instance of insufficient motivation, an autonomous rationale can, however, only enfold its potential positive effect when it is salient and prioritized over controlling rationales (Cunningham & Brosch, 2013) or, in other words when it prevails over controlling rationales (Gillet et al., 2017; Howard et al., 2016; Thibault Landry et al., 2020). I am not aware of research which examines how quickly a newly discovered rationale becomes dominant in behavior regulation and, thus, encourage research in this regard. Another limitation, also in respect of the study's design, is that the activity assessment took place at the end of the day, several hours past the daily signals. Previous research indicates that people often struggle to evaluate motivation-related experiences correctly (Wooley & Fishbach, 2015); further research should take such memory-biases into account.

Lastly, in the current study, I recommend that future research controls for the influence of contextual factors such as activity-characteristics. The multitude of aversive activities that I have assessed most likely varied with regard to their demands (see Hennecke et al., 2019); it may be that different types of "aversion" resulted in large within-person variance and small between-person variance. Hennecke et al. (2019) found, however, interaction effects of different self-regulatory strategies with activities' demand characteristics (e.g., boredom, physical effort, emotional challenge); whereas focusing on an aversive activity's positive consequences, for example, had no effect on perceived self-regulatory success in instances of high physical effort, it did have an effect when physical effort was low. Similarly, self-generating autonomous rationales for engaging in an aversive activity might not be sufficient to facilitate engagement in all kinds of aversive activities. Regarding this issue, findings from emotion-regulation research have led to the conclusion that there is no single strategy that helps in every emotionally challenging situation (see Bonanno & Burton, 2013; Haines et al., 2016); recently conducted studies suggest that this is also true for self-regulatory challenges

(Bürgler, Hoyle, & Hennecke, 2021; Van Eerde & Klingsieck, 2018; Vishkin, Hasson, Millgram, & Tamir, 2020). The adaptiveness of emotion-regulation (Kobylinska & Kusev, 2019; Troy, Shallcross, & Mauss, 2013) as well as self-regulatory strategies (Hennecke et al., 2019) seems to depend on contextual characteristics. Many instances of insufficient motivation in everyday life, may require more than simply a single strategy, such as self-generating autonomous rationales. The solution may be regulatory flexibility (e.g., Bürgler et al., 2021; Kobylinska & Kusev, 2019). Accordingly, I conclude that self-generating autonomous rationales in instances of insufficient motivation might be unhelpful in situations that are emotionally challenging or where the person feels that their abilities are not sufficient to master the task. Thus, future research should consider that the (motivation-related) experience in physically, mentally, or emotionally challenging aversive activities could also be affected by the person's expectation to meet the specific challenge (see for example Canning & Harackiewicz, 2015). It could furthermore examine whether self-generating autonomous rationales is more effective in the work domain compared to specifically social domains (cf. Kazén et al., 2015), because in the latter, aversive "have-to" activities could be more strongly associated with negative emotions and interpersonal conflict and, thus, emotion-regulation or conflict-management strategies might be more relevant. Nevertheless, as indicated by experimental lab studies (Study 1, Study 4), where participants had to work on boring tasks, self-generating autonomous rationales could be especially effective in boring and rather easy tasks.

4.5.3.2 Conclusion

In line with my predictions based on self-determination theory (Ryan & Deci, 2000, 2020), this study shows that autonomous rationales lead to adaptive outcomes with regard to aversive activities in everyday life. However, in contrast to my hypothesis, I did not find that self-generating autonomous rationales, compared to answering irrelevant questions, had an impact on how people felt during the focal activity or how they performed it. When examining the effectiveness of self-generated autonomous rationales prior to engaging in aversive activities, future research should take the role of context characteristics into account: the strategy might be more effective with regard to boring, in contrast to emotionally challenging or difficult activities.

5 Overall Discussion

The aim of this research was to provide evidence for the effectiveness of positive reappraisal as a volitional strategy and to shed light on the underlying process. Utilizing a self-determination theory-perspective (Deci & Ryan, 2000; Ryan & Deci, 2000), I proposed to operationalize positive reappraisal in instances of insufficient motivation as self-generating autonomous rationales for engaging in boring/aversive activities in instances of controlled motivation (see chapter 3.4). In four experimental lab studies as well as in one quasi-experimental field study, I tested the proposition that self-generating autonomous rationales enhances motivation toward an otherwise insufficiently motivated activity; furthermore, in one experimental lab study, I tested the proposition that self-generating autonomous rationales unfolds its effect via a facilitated internalization of the focal behavior.

5.1 Summary and Integration of the Main Findings

Table 17 displays a summary of my main findings.

The main purpose of Study 1 was to test the hypothesis that receiving controlling rationales for engaging in a boring task and additionally self-generating autonomous rationales counteracts detrimental effects, facilitates adaptive outcomes and sustains self-regulatory performance in a subsequent activity. In line with my hypotheses, I found that people who self-generated autonomous rationales in instances of controlled motivation toward a boring task in comparison to people who didn't do that, rated the boring task as more valuable/useful, reported greater interest/enjoyment, and showed enhanced performance in a subsequent self-regulatory task. I furthermore discussed a spill-over effect of self-generating autonomous rationales in addition to receiving controlling rationales on the subsequent task, because participants in this condition, compared to participants in the other condition, reported significantly higher interest/enjoyment toward the subsequent task. Moreover, I found that providing autonomy support for the boring task alone as well as additionally self-generating autonomous rationales, was also associated with higher value/usefulness ratings as well as increased interest/ enjoyment toward the boring task. This study replicated findings from previous studies analyzing the effectiveness of autonomy support and provided first evidence that self-generating autonomous rationales also has a positive-adaptive effect when there is controlled motivation.

Table 17

Summary of the Main Findings

Hypothesis	Conditions	Outcome variable	Hypothesis confirmed?		
Study 1/2/3, Context: Laboratory study, uninteresting vigilance task followed by Stroop task			**1**	**2**	**3**
Receiving autonomy support compared to receiving controlling rationales for engaging in an uninteresting activity, leads to enhanced motivation-related outcomes with respect to the activity.	Receiving autonomy support vs. receiving controlling rationales	value/usefulness perceptions interest/enjoyment self-regulatory performance	**Yes** **Yes** No	**Yes** **Yes** No	**Yes** No No
Receiving autonomy support for engaging in an uninteresting task and additionally self-generating autonomous rationales, compared to receiving controlling rationales only, leads to enhanced motivation-related outcomes with respect to the activity.	Receiving autonomy support and additionally self-generating autonomous rationales vs. receiving controlling rationales	value/usefulness perceptions interest/enjoyment self-regulatory performance	**Yes** **Yes** No	**Yes** **Yes** No	**Yes** No No
Receiving controlling rationales for engaging in an uninteresting task and additionally self-generating autonomous rationales, compared to additionally answering irrelevant questions, leads to enhanced motivation-related outcomes with respect to the activity.	Receiving controlling rationales and additionally self-generating autonomous rationales vs. additionally answering irrelevant questions	value/usefulness perceptions interest/enjoyment self-regulatory performance	**Yes** **Yes** No	No No No	No No No
Receiving autonomy support for engaging in an uninteresting task compared to receiving controlling rationales, leads to enhanced self-regulatory performance in the subsequent activity	Receiving autonomy support vs. receiving controlling rationales	self-regulatory performance in a subsequent task	No	No	No
Receiving autonomy support for engaging in an uninteresting task and additionally self-generating autonomous rationales, compared to receiving controlling rationales only, leads to enhanced self-regulatory performance in the subsequent activity.	Receiving autonomy support and additionally self-generating autonomous rationales vs. receiving controlling rationales	self-regulatory performance in a subsequent task	No	No	No
Receiving controlling rationales for engaging in an uninteresting task and additionally self-generating autonomous rationales, compared to additionally answering irrelevant questions, leads to enhanced self-regulatory performance in the subsequent activity.	Receiving controlling rationales and additionally self-generating autonomous rationales vs. additionally answering irrelevant questions	self-regulatory performance in a subsequent task	**Yes**	No	No

Hypothesis	Conditions	Outcome variable	Hypothesis confirmed?
Study 4, Context: Laboratory study, uninteresting vigilance task			
Receiving controlling rationales for engaging in an uninteresting task and additionally self-generating autonomous rationales, compared to additionally answering irrelevant questions, leads to enhanced motivation-related outcomes with respect to the activity.	Receiving controlling rationales and additionally self-generating autonomous rationales vs. additionally answering irrelevant questions	autonomous motivation self-regulatory performance	**Yes** No
Receiving controlling rationales for engaging in an uninteresting task and additionally self-generating autonomous rationales, compared to additionally answering irrelevant questions, has an indirect effect on subjective post task vitality trough increased autonomous motivation.	Receiving controlling rationales and self-generating autonomous rationales in addition vs. additionally answering irrelevant questions	(indirect effect on) subjective vitality	**Yes**

Hypothesis	Conditions/ Variables	Outcome variable	Hypothesis confirmed?
Study 5, Context: Experience sampling study, aversive "have-to" activities in everyday life			
Self-generating autonomous rationales for engaging in an aversive activity, compared to answering irrelevant questions with regard to such an activity, has a positive effect on subjective ease and self-regulatory success. (between-persons)	self-generating autonomous rationales vs. answering irrelevant questions	subjective ease subjective self-regulatory success	No No
Identifying more-autonomous (vs. less-autonomous) rationales for engaging in an aversive activity is associated with greater subjective ease as well as greater self-regulatory success. (within-person)	Motivational quality of rationale (higher motivational quality = more-autonomous)	subjective ease subjective self-regulatory success	**Yes** **Yes**
Self-generating rationales for engaging in aversive activities during the day, compared to answering irrelevant questions with regard to such an activity, has a positive effect on subjective vitality and satisfaction at the end of the day. (between-persons)	self-generating autonomous rationales vs. answering irrelevant questions	subjective vitality (end of the day) satisfaction (end of the day)	No No

With Study 2 and 3 I aimed at replicating my findings from Study 1. However, I failed to replicate most results of the original study, except of higher value/usefulness ratings toward the focal task for people who received autonomy support compared to people who received controlling rationales only. Regarding the issue of these null-findings, unsuccessful

manipulations with regard to self-generating autonomous rationales and insufficient statistical power serve as explanations.

In Study 4 I adapted my instruction to self-generate autonomous rationales. As hypothesized, I found that self-generating autonomous rationales for a boring task enhances autonomous motivation toward the task and, thereby, facilitates subjective post-task vitality.

In my final study, Study 5, I used experience sampling method and investigated whether self-generating autonomous rationales helps in adapting to aversive activities in everyday life. Across conditions, I found that people having rationales for engaging in an aversive activity of higher (vs. lower) motivational quality reported more subjective ease during activity engagement as well as subjectively greater self-regulatory success regarding the activities. Moreover, I found that people who were prompted to self-generate autonomous rationales for upcoming aversive activities, compared to people who weren't prompted to do that, reported higher motivational quality of their rationale for engaging in such activities. However, this was not reflected in statistically significant differences in self-reported experiences or behavior toward the focal activity. Although I cannot reject the null hypothesis in this case, I argue that this pattern of results indicates that self-generating autonomous rationales is a promising approach to deal with aversive activities. I assume, however, that in the current study the manipulation was not strong enough to yield between-subject effects and that the strategy's effectiveness might vary as a function of contextual features such as the activity's demand characteristics.

In the following, I will integrate my findings in related research and discuss mechanisms and determinants of the effectiveness of self-generated rationales for engaging in boring or aversive tasks in instances of insufficient motivation. Thereafter, I will propose an integrative model of positive reappraisal as a volitional strategy, suggest future research directions, and derive practical implications before I present my conclusion.

5.1.1 The Effectiveness of Self-Generated Autonomous Rationales

The current work provides empirical evidence where there have previously only been speculations; it shows that both sources of rationales, externally provided as well as self-generated, can be effective in enhancing motivation-related outcomes.

Historically, self-determination theory generated as one focusing on social-environmental factors enhancing or thwarting motivation (Deci & Ryan, 1985; Ryan & Deci, 2000); thus, with regard to rationales, it is mainly concerned with the motivational effects of (e.g.) rationale provision and autonomy support. Despite such a focus on social environmental factors, researchers in the field of self-determination theory have long speculated about whether self-generating rationales can have positive effects similar to rationale provision and autonomy support respectively (see Deci & Ryan, 2008; Jang, 2008; Vansteenkiste et al.

2018). In the current work, I take self-determination theory as a theory of change in motivation, but I examine the effect of self-generated instead of provided rationales as triggers from inside of a person.

Pertaining to proposition 1 (chapter 3.4), my research shows that successfully prompting people to self-generate autonomous rationales for engaging in an easy but boring activity, which they feel they have to engage in (i.e., “have-to” activity), enhances autonomous motivation toward the focal activity (see Study 1 and 4) and fosters subjective vitality after activity engagement (Study 4), as well as self-regulatory success in a subsequent task (Study 1). Study 1 indicates, furthermore, that self-generating autonomous rationales might be as motivationally productive as autonomy support.

5.1.1.1 Facilitation of Autonomous Motivation Toward the Focal Activity

According to self-determination theory, assessing the quality of motivation is crucial with regard to predicting more-distal motivation-related outcomes, because autonomous/high quality motivation in contrast to controlled/low-quality motivation is associated with more-distal positive outcomes (e.g. Howard et al., 2016; Steingut et al., 2017; Vansteenkiste et al., 2018), such as subjective vitality (e.g. Nix et al., 1999).

In the past, experimental studies have demonstrated that externally provided rationales can reveal personal relevance and, thereby, enhance autonomous motivation (e.g., Deci et al., 1994; Reeve et al., 2002); furthermore, previous questionnaire-based studies suggested that people can provide themselves with personally relevant rationales (e.g., Green-Demers, 1997). The findings from my lab studies add to this by demonstrating that people can discover personal relevance themselves (i.e., self-generate autonomous rationales) and, thereby, increase autonomous motivation. In my lab studies I prompted half of the participants to self-generate autonomous rationales for engaging in boring/uninteresting activities and assessed the effect on autonomous motivation toward the activity. In line with my hypotheses, self-generating autonomous rationales for engaging in boring “have-to” activities was positively associated with increased autonomous motivation. This effect was evident both when I assessed components of autonomous motivation (task value and interest/enjoyment, see Study 1) and when I assessed it as a composite score of identified and intrinsic regulation (Study 4).

My experimental findings expand on findings from questionnaire-based studies which indicate that self-generating autonomous rationales can be an effective way of self-motivation (e.g., Schwinger et al., 2009). Furthermore, they expand on previous experimental studies which also demonstrated the effectiveness of self-generated rationales, but omit the assessment of autonomous motivation toward the focal activity (Canning & Harackiewicz, 2015; Kazén et al., 2015).

5.1.1.2 Facilitation of Energy Available to the Self

In line with theoretical considerations as well as previous studies, I found evidence for the energizing effects of self-generated autonomous rationales (cf. Martela et al., 2016; Ryan & Deci, 2008). I chose two different approaches to examine this effect: Self-regulatory success in a subsequent task (cf. Muraven et al., 2008) and self-reported subjective vitality (cf. Ryan & Frederick, 1997).

First, I found that self-generating autonomous rationales for a boring task in an instance of controlled motivation had a positive effect on self-regulatory success in a subsequent task (Study 1). In contrast to previous studies (e.g. Muraven et al., 2008), I did not find this effect in any of my first 3 studies for participants who received rationales in an autonomy supportive manner. In addition to these null-findings with respect to providing autonomy support, I was not able to replicate the finding in Study 2 and Study 3; as discussed above, lacking power might be an explanation regarding this issue. Thus, in light of the ongoing discussion about the carry-over effect (Inzlicht & Friese, 2019), I conclude that the effect of autonomy support (Study 1, 2, 3) or self-generation of autonomous rationales for engaging in a boring "have-to" task (Study 2 and Study 3) might have been too small to be reflected in self-regulatory success in a subsequent task.

Second, I found an (indirect) effect of self-generating autonomous rationales for engaging in a boring "have-to" activity on post-task vitality transmitted through increased autonomous motivation (Study 4). In other words, the effect of self-generated autonomous rationales on post-task subjective vitality was only evident when the self-generating process had increased autonomous motivation toward the focal task. This finding adds to several other findings from previous studies demonstrating that increasing autonomous regulation (vs. controlled regulation) helps to maintain/enhance energy (see for example Kazén et al., 2015; Martela et al., 2016). This underscores the potential of self-generated autonomous rationales, because subjective vitality is associated with other positive outcomes such as more happiness, joviality and greater perceived capacity to invest effort (e.g., Bertrams et al., 2020).

In sum, my experimental findings show that self-generating autonomous rationales can be an effective strategy to motivate oneself to engage in boring or aversive activities in instances of controlled motivation. However, not all effects I had expected, occurred. In the following I will discuss theoretical as well as methodological reasons regarding this issue.

5.1.1.3 Discussion of the Null-Findings

My null-findings include occasions where my manipulations were not successful (Study 2 and 3) as well as where manipulations were successful, but did not lead to the expected effects (performance variable in Study 1 and 4; Study 5).

Although manipulations in Study 2 and 3 were equivalent to Study 1, the effect of condition on the dependent variables was only significant in the latter. On the one hand, this could be attributable to lacking power, and, on the other hand, it might be that the manipulation was not strong enough. Thus, for future research I recommend to adapt the instructions to self-generate autonomous rationales aiming at a stronger effect.

I think that my null-findings with regard to performance in Study 1 and Study 4, despite successful manipulation, have some noteworthy theoretical implications. Here, people who received controlling rationales for engaging in the focal task only as well as people who self-generated autonomous rationales in addition to receiving controlling rationales, performed well in the vigilance task. At first glance, this seems to contradict meta-analytic findings by Steingut et al. (2017) suggesting that rationale type moderates performance; however, in their meta-analysis, the authors did not specify task difficulty. It might be that type of rationale is less crucial with respect to boring, easy tasks such as the vigilance task I used in my lab studies, which suggests that a rationale's motivational quality is of relative importance. More specifically, the answer to the question as to whether motivational quality matters, depends on the outcome of interest. With regard to performance, for example, a recently published meta-analysis (Van den Broek et al., 2021) shows that introjected (i.e., controlled) as well as identified (i.e., autonomous) regulations were both associated with better performance. To illustrate this: The ambition to perform a boring task well may be due to the fact that one does not want to appear stupid in front of their colleagues, or that one considers it important to perform one's duty conscientiously. Moreover, previous research suggests that the difference in rationales' motivation quality is most likely reflected in the quality, but not quantity of performance (see Cerasoli et al., 2014). Thus, both types of rationale may be sufficient in order to perform relatively well in an easy task such as the vigilance task I utilized in my lab studies. This shows that the relationships of types of motivation and well-being-, attitudes- and performance-related implications are complex and require a nuanced examination (see Van den Broek et al., 2021).

For my null-findings in the field study (Study 5), I propose the following possible explanations: It is crucial in respect of the effectiveness of self-generated positive rationales in the pre-action phase as well as in the action-phase that the self-generated rationales are salient (cf. Cunningham & Bosch, 2013; Engelschalk et al., 2016). However, whereas I controlled for people actually self-generating autonomous rationales while contemplating an upcoming aversive activity (i.e., pre-action phase), I do not know whether or not they actually

visualized those rationales during activity engagement (i.e., action-phase). Moreover, by simply inquiring about aversive activities in Study 5, I may have underestimated the variety of activities and their respective demands (see Bonanno & Burton, 2013). These different situational demands most likely require different strategies (Bürgler et al., 2021; Kobylinska & Kusev, 2019). Whereas self-generating autonomous rationales is most likely effective with regard to boring tasks, people may rather need problem solving strategies when they perceive their abilities as insufficient in order to master the task (e.g., Kehr, 2004), situational strategies (Duckworth et al., 2016) when they perceive the situation as controllable (e.g., Troy et al, 2013), and emotion-regulation strategies when the focal activity is associated with stress (Hennecke et al., 2019). I will discuss potential determinants further below in chapter 5.1.3.

In sum, I expected that effectiveness of self-generating autonomous rationales in instances of controlled motivation increases as a function of increased personal meaningfulness with respect to the focal behavior. However, my findings raised the question as to whether higher motivational quality is always necessary and whether self-generating autonomous rationales can always be effective in instances of insufficient motivation. With regard to the former issue I argue that motivational quality is of relative importance and depends on the outcome of interest. Moreover, in many instances of insufficient motivation in everyday life, not just one single strategy such as self-generating autonomous rationales can be effective for all kinds of aversive activities; however, self-generating autonomous rationales is likely most effective with regard to boring or aversive tasks that are not too difficult or stressful.

5.1.2 The Process Underlying the Effectiveness of Self-Generated Autonomous Rationales

Regarding the process underlying the effectiveness of self-generated autonomous rationales for engaging in boring/aversive “have-to” activities, the current research addressed the self-generation as an activity and internalization as a motivational mechanism (cf. Figure 2).

5.1.2.1 The Activity: Self-generating Autonomous Rationales in Addition to Initial Rationales

In functional terms, self-generating autonomous rationales successfully means relating the focal activity to mental representations of personally meaningful goals, personal values or psychological needs in addition to rationales initially perceived. On a phenomenal level this is expected to increase the feeling that engaging in the focal activity is worthwhile. To provide an example from the participants in my experiments: Some of them visualized that the monotonous task they had to complete during the experiment (i.e., a vigilance task) could help them to train their concentration, which they perceived as highly relevant for preparing for as

well as writing exams, even though it might also be boring. Thus, as a result of prompting them to self-generate autonomous rationales, they discovered personally meaningful rationales in addition to the ones initially perceived (e.g., a grade bonus for their participation). I suggest that this activity relates to what Uusberg and colleagues term repurposing (Uusberg, Taxer, Yih, Uusberg, & Gross, 2019), an issue I will discuss in more detail in chapter 5.2.

In my experimental studies I prompted participants to self-generate autonomous rationales in various ways. Specifically, in Study 1-3, my instruction prompted participants to see the boring activity in a "positive light" (cf. Folkman & Moskowitz, 2000) and to think about how they could benefit personally from carrying out the task (see also, for example, Kazén et al., 2015). The instruction in Study 4 was similarly structured, but more concrete as it encouraged participants to think about how they could learn/train something by working on the task that could be personally useful with regard to studies/job/personal life (cf. Canning et al., 2015). The instruction in my experience sampling study (Study 5), however, explicitly addressed the rationale for engaging in the aversive activity; here, participants were encouraged to visualize a personally meaningful rationale for activity engagement. Each variation aimed at people appraising the focal activity as more personally meaningful than before the prompted self-generation of autonomous rationales. However, these manipulations might have varied in strength. Thus, for future research, I recommend that manipulations be further improved to prompt participants to visualize highly autonomous rationales. Future research could also examine further critical conditions of highly effective self-generated rationales. Whereas in the current work, I focused on content (autonomous rationale), Vansteenkiste et al. (2018), for example, propose to additionally control for specificity (relative to vague) and novelty.

The prompts in my lab studies are similar to the instructions used in the experimental study by Kazén and colleagues (2015), examining the effectiveness of self-motivation; they are furthermore similar to instructions used in an experimental study by Canning and Harackiewicz (2015), where the authors examined the effectiveness of utility-value intervention in the lab. However, a comparison of the procedures reveals that each study captured the effect in a different context; the task characteristics in these experiments were either different to mine or even unspecific. Whereas in my lab studies I controlled for task interest-level (i.e., low), task-difficulty (i.e., easy) as well as for quality of motivation toward the task (i.e., controlled motivation), I did not control for task-difficulty in Study 5. In contrast, Kazén et al. (2015) as well as Canning and Harackiewicz (2015) controlled for task-difficulty (i.e., high) and expectancy of success, but both groups of authors left interest-level and quality of motivation unspecified. Thus, I conclude that my studies are the first to examine the effects of prompting people to self-generate autonomous rationales for engaging in boring/aversive "have-to" activities. However, depending on the context, different activities and mechanisms might be

relevant in order to achieve desired outcomes. Thus, controlling for expectancy of success in Study 5, for example, could have helped to discover interaction effects of quality of motivation toward the task and expectancy of success (see for example Eccles & Wigfield, 2002).

5.1.2.2 The Mechanism: Internalization of the Focal Activity

Pertaining to proposition 2 (chapter 3.4), I found evidence that prompting people to self-generate autonomous rationales for engaging in boring/aversive "have-to" activities enhances autonomous motivation toward the focal activity; this suggests that the activity was further internalized (e.g., Ryan & Deci, 2000; Vansteenkiste et al., 2018). More specifically, in my lab studies I found significant group-differences in autonomous motivation, which indicates different levels of internalization. In accordance with the predictions of organismic integration theory, I found that prompting the self-generation of autonomous rationales (vs. not) had a positive effect on subjective vitality (Study 4) when it led to increased autonomous motivation toward the focal task. Study 5 supports this theoretically as I found, across conditions, that rationales of higher motivational quality were positively associated with more-distal outcomes such as subjective ease during activity engagement. Thus, by drawing on organismic integration theory, I conclude that visualizing the focal activity in relation to personally meaningful goals, value realization or need satisfaction (i.e., self-generating rationales), leads to a self-deployed internalization process and, thereby, supports (e.g.) the need for autonomy; this, in turn has a positive impact on the person's momentary experience as well as their behavior (Ryan & Deci, 2000; Ryan & Deci, 2019). However, as I have assessed the internalization as an outcome, future research could examine the internalization process itself and investigate cognitive and affective processes involved in more detail (see future research directions in chapter 5.2.2.).

Self-determination theory suggests that self-generating autonomous rationales also enhances two other constructs which both go hand in hand with internalization: perceptions of self-relevance (Vansteenkiste et al., 2018) and self-concordance (e.g., Sheldon & Elliot, 1999; Sheldon, 2014). Whereas previous research has studied the consequences of pursuing more or less self-concordant goals (see for an overview Sheldon, 2014) as well as conditions for the adoption of self-concordant goals (Milyavskaya et al., 2014), my findings suggest that people can actively increase a goal's self-concordance.

Beyond self-determination theory, my findings are also in accordance with, for example, predictions from the identity-value model (Berkman, Livingston, & Kahn, 2017a; Berkman, Livingston, & Kahn, 2017b), which suggests a valuation-based mechanism for effective self-regulation. The model proposes that self-regulation is driven by subjective value of the focal activity/goal and predicts that strategies that increase the saliency of reasons why a specific activity/goal is identity- or self-relevant, facilitate self-regulation. Recently,

researchers studying the effectiveness of utility interventions have picked up on the importance of different types of value (e.g., Prinisk, Hecht, & Harackiewicz, 2018; Rosenzweig, Wigfield, & Eccles, 2022). My findings show that this step is promising and should be pursued further.

5.1.3 Determinants of the Effectiveness of Self-Generated Autonomous Rationales

Thus far, I have discussed the process that explains the effectiveness of self-generating autonomous rationales in instances of insufficient motivation. In the following I will discuss context variables and moderators that might influence the effectiveness of self-generating autonomous rationales. Regarding this issue, the strategy-situation-fit hypothesis (e.g., Bonanno & Burton, 2013; Haines et al., 2016) proposes that self-regulatory strategies are particularly effective when applied in the appropriate context. Accordingly, I suggest that contextual demands such as controllability (e.g., Haines et al., 2016) and activity demand characteristics (e.g., Hennecke et al., 2019) can influence the strategy's effectiveness. In respect to person-related factors, I propose that several rationale-related features as well as state/trait mindfulness (e.g., Donald et al., 2020) can determine the self-generated rationale's effectiveness.

5.1.3.1 Controllability of a Situation

Findings from emotion-regulation research suggest that strategies addressing the appraisal of events or activities, such as self-generating autonomous rationales, are only conducive when the situation is relatively uncontrollable; in controllable situations, strategies that alter the situation seem to be more effective (Haines et al., 2016; Troy et al., 2013; Troy, Ford, McRae, Zarolia, & Mauss, 2017). *Controllability* refers to the degree to which a person can change a situation (Heth & Somer, 2002; Troy et al., 2013). This could explain why contemplating about a boring/aversive task and successfully self-generating autonomous rationales had an effect in my lab studies but failed to do so in my field study. In contrast to experimental studies, where situation controllability in the lab was relatively low, participants in the field study pursued individual activities with potentially different degrees of controllability. In contrast to the highly controlled lab conditions, people in the field may have decided not to engage in the activity, or other external factors may have prevented them from doing so. Moreover, procrastination might be more likely when the controllability of the focal situation is perceived as relatively high (Bäulke, Daumiller, & Dresel, 2021; Blunt & Pychyl, 2000; Steel, 2007). Thus, it is reasonable to assume that people tend to change the situation (if possible) rather than change their evaluation of it (cf. Duckworth et al., 2016).

Although I asked participants in the field study to contemplate an up-coming aversive activity they feel they have to engage in, I did not control for subjective controllability. However, the controllability of the situation largely determines whether situational or cognitive strategies are more promising (cf. Duckworth et al., 2014). Thus, future research expanding on my field study could control for subjective controllability with regard to each activity. Only if people cannot change the situation (subjectively) self-generating autonomous rationales might appear to be the appropriate strategy for them (cf. Bonanno & Burton, 2013; Duckworth et al., 2016).

5.1.3.2 Activity Demand Characteristics

Research demonstrates that a self-regulatory strategy's effectiveness varies as a function of an *activity's demand characteristics* (Hennecke et al., 2019). In this regard, Hennecke et al. (2019), for example, distinguish between physical effort, mental effort, emotional challenge and boredom. Accordingly, self-generating autonomous rationales might be not sufficient in instances where people deal with effortful activities or difficult tasks; such situation factors would influence a person's expectancy of success, which also affects motivation (e.g., Eccles & Wigfield, 2002; Engelschalk et al., 2016; Kehr, 2004) and calls for problem-solving strategies (Kehr, 2004).[29]

In my lab studies I asked participants to work on a boring, but nevertheless easy task; I controlled for task difficulty and, thus, expectancy to succeed was presumably high among all participants. Here, self-generating autonomous rationales appeared to be effective for a number of participants (see Study 1 and Study 4). In my field study (Study 5), however, where participants were asked to think of an aversive task to perform in the coming hours, I did not control for demand characteristics or expectancy to succeed. Thus, in view of my findings, I suggest that self-generating autonomous rationales is effective with regard to boring and rather easy tasks; however, self-generating autonomous rationales alone might not be sufficient with regard to dealing effectively with subjectively effortful aversive activities; in such instances problem-solving strategies would be additionally required (Kehr, 2004). Research on the effectiveness of utility value interventions suggests that self-generating autonomous rationales is particularly helpful for people who initially have a relatively low expectancy to succeed in a given task (Canning & Harackiewicz, 2015; Hulleman et al., 2017). Regarding the self-generation, rationales that increase motivation quality even appear to have the potential to buffer the detrimental influence of low expectancy of success on performance (e.g., Putwain, Nicholson, Pekrun, Becker, & Symes, 2019). Importantly, these studies were conducted with

[29] Note that a feeling of "not being motivated enough to do something" could stem from low desirability as well as low expectancy of success. However, according to Kehr (2004), overcoming insufficient motivation as a motivational barrier requires volitional strategies; yet the feeling of being insufficiently motivated as a consequence of low expectancy of success requires the deployment of problem solving strategies (cf. Kehr, 2004).

students and, thus, examined effects in rather uncontrollable situations (see 5.1.3.1); the same students might have procrastinated during the same tasks in more controllable situations despite prompts that lead to enhanced value perceptions. I encourage researchers to examine these interrelations in future studies.

5.1.3.3 Mindfulness

Mindfulness refers to the "process of regulating attention in order to bring a quality of non-elaborative awareness to current experience and a quality of relating to one's experience within an orientation of curiosity, experiential openness, and acceptance" (Bishop et al., 2004, p. 234). Converging evidence suggests that greater mindfulness is conducive to discovering more-autonomous rationales (Donald et al., 2020; Pagnini & Langer, 2015; Smyth, Werner, Milyavskaya, Holding, & Koestner, 2020). Regarding this issue, meta-analytic findings by Donald et al. (2020) show, for example, that mindfulness is positively associated with autonomous motivation and negatively with controlled motivation. Moreover, research demonstrates that mindfulness is positively associated with setting more-autonomous goals (Smyth et al., 2020). Mindfulness appears to help "individuals to bring their goals, actions, and responses to the pressures and pulls of the world into alignment with personal values" (Ryan, Donald, & Bradshaw, 2021, p. 304).

Findings from emotion-regulation research also show that mindfulness and positive reappraisal positively interact: Garland and colleagues, for example, proposed the Mindfulness-to-Meaning Theory (Garland, Farb, Goldin, & Fredrickson, 2015); the authors argue that "mindfulness and reappraisal may reciprocally enhance one another as interdependent components of a positive feedback loop whose structure might be best described as an upward spiral" (Garland, Kiken, Faurot, Palsson, & Gaylord, 2017, p. 381).

Consequently, I recommend that future research examines the role of (trait and state) mindfulness with regard to the effectiveness of self-generated autonomous rationales in instances of insufficient motivation.

5.1.3.4 Rationale-Related Features

For a given self-generated rationale to promote the process of internalization, the rationale needs to be perceived as personally meaningful (i.e., high motivation quality). Thus, when self-generating a rationale in an instance of controlled motivation, it is critical that the rationale be autonomous rather than controlling (cf. Study 1 and Study 4). The effect of the self-generated rationale should be greater the more-autonomous the self-generated rationale is; this seems to apply to well-being- and health-related outcomes in particular (Van den Broek et al., 2021). Importantly, the self-generated autonomous rationale is effective only when its

effect prevails over the effect of the pre-existing controlling rationales (Gillet et al., 2017; Howard et al., 2016). Another critical feature is whether the rationale is concrete instead of vague or abstract. The more a person can concretely visualize the self-generated autonomous rationale and relate it to the activity at hand, the stronger the effect should be (see also Vansteenkiste et al., 2018). This should especially be the case if the person has a mental image in mind (e.g., Job & Brandstätter, 2009).

In addition, the salience of the self-generated rationale should be considered (cf. Cunningham & Bosch, 2013; Engelschalk et al., 2016). The effect of the self-generated rationale on the initiation of the behavior should be greater the more salient it is just before and during initiation; it should be greater on well-being-/health-related outcomes the more salient the rationale is during activity engagement.

The present work is the first to explicitly conceptualize positive reappraisal as a volitional strategy; by drawing on self-determination theory, my research provides a deeper understanding of how positive reappraisal works, going beyond previous correlational studies that focused on the comparable strategy enhancement of personal significance (e.g., Grunschel et al., 2016; Kryshko et al., 2020). In sum, I found support for proposition 1 as well as proposition 2. Based on my findings, I conclude that, in principle, self-generating autonomous rationales in instances of insufficient motivation is crucial with regard to desirable outcomes (e.g., high-quality motivation or well-being), although there are a few exceptions (e.g., performance in easy tasks). Moreover, I suggest that mindfulness facilitates the effectiveness of self-generated autonomous rationales for engaging in (e.g.) aversive activities and that activity demand characteristics, just like controllability, can influence the strategy's effectiveness, because they determine the strategy-situation fit (cf. Bonanno & Burton, 2013).

In the following I will expand on this self-determination-theory-based framework by suggesting an integrative framework of positive reappraisal as a volitional strategy which highlights the strategy's nature more in-depth. It can be applied to various other motivation (and self-regulation) theories and integrates situation- as well as person-related factors that potentially influence the strategy's effectiveness. Thus, this integrative framework may serve researchers from different fields regarding next steps in research on the when and how concerning the effectiveness of positive reappraisal as a volitional strategy.

5.2 An Integrative Framework of Positive Reappraisal as a Volitional Strategy and Future Research Directions

5.2.1 Proposition of an Integrative Framework of Positive Reappraisal as a Volitional Strategy

My *integrative framework of positive reappraisal as a volitional strategy* (see Figure 8) is based on the *integrative framework of reappraisal* as an emotion-regulation strategy, proposed by Uusberg et al. (2019). The latter builds on the process model of emotion-regulation (Gross, 1998) and describes when and how reappraisal can help in regulating emotions. In contrast, my framework builds on the process model of self-regulation (Duckworth et al., 2014) and describes how positive reappraisal can lead to changes in motivational states. More specifically, my integrative framework describes positive reappraisal as a process of change in appraisal outcomes and shows when and how such changes can result in enhanced motivation in instances of insufficient motivation.

However, according to the framework proposed by Uusberg et al. (2019), two inputs to the appraisal process must be considered in order to understand appraisal outcomes that leads to (insufficient) motivation: the goal set (i.e., the currently active representations of a desired future state) and the construal of the situation (i.e., the representation of how the situation subjectively is). Accordingly, any appraisal outcome is "a summary representation of the relationship between the construed situation and the goal set" (Uusberg et al., 2019, p. 4). According to Uusberg et al. (2019), these appraisal outcomes can be understood as values on more abstract appraisal dimensions such as desirability. Taking the two inputs to the appraisal process into account, the authors propose two ways to change appraisal outcomes: on the one hand, by changing how one views the focal situation, a strategy they term reconstrual; and, on the other hand, by connecting the focal situation to other goals, which is termed repurposing (Uusberg et al., 2019).

In the following I will stepwise discuss the positive reappraisal process according to my integrative framework in terms of incentives and motives; furthermore, I will propose variables that potentially influence its effectiveness as a volitional strategy in instances of insufficient motivation.

As shown in Figure 8, the integrative framework describes positive reappraisal as a multi-component, cognitive change process (Ford, Karnilowicz, & Mauss, 2017; Ochsner & Gross, 2008; Uusberg et al., 2019). Furthermore, the framework takes into account person- and situation-related factors which potentially determine the effectiveness of positive reappraisal as a volitional strategy.

Initial situation		**Positive reappraisal process**		**Outcome situation**
Intrapsychic conflict	Reappraisal affordances	Positive reappraisal strategies	Appraisal change vector	Regulated motivational states
Need-discrepant goal pursuit	Goal set malleability Construal malleability	**Positive repurposing** **Positive reconstrual**	**Shift of appraisal along appraisal dimensions**	Enhanced motivation toward the goal

Activities and potential mechanisms

Repurposing

Self-determination theory
Internalization continuum

Motive-disposition theory
Degree of enhanced motivational congruence

Expectancy-value theory
Relevance continuum

Reconstrual

Self-determination theory
Intrinsic motivation quantity

Motive-disposition theory
Degree of an implicit motive's arousal

Expectancy-value theory
Intrinsic value quantity

***Factors potentially determining** the …*

… strategy's functionality	*… reappraisal affordances*	*… discovery of incentives*	*… shift along appraisal dimension*	*… actual effect on motivational states*
Person-related				
Expectancy of success Emotional state	Subjective malleability Mindfulness	Mindfulness Motivation competence	Content of the new appraisal (e.g., the motive's motivation quality) Specificity of the new appraisal (abstract vs. concrete) Outcome expectation	Incentive salience
Situation-related				
Controllability Activity demand characteristics				

Figure 8. An integrative framework of positive reappraisal as a volitional strategy.

The following example from the work context illustrates the positive reappraisal process as depicted: An employee's motivation toward a task might be low (i.e., appraisal outcome) when he feels that he has to engage in a monotonous, subjectively boring task (i.e., construal)

in order to avoid criticism from his boss or to receive a bonus (i.e., goal set). Here, the employee could implement positive reappraisal which involves either reconstruing the focal situation in a positive, more-motivating manner or repurposing the focal task to purpose-related incentives (Rheinberg & Engeser, 2018) with more-positive incentive value. He could, for instance, reconstrue the situation as a "relaxation phase during a stressful workday" and/or implement repurposing by visualizing that completing the activity will not only please his supervisor but is "an important building block of a larger project" that is crucial to his career. Thereby, the implementation of positive reappraisal could support his cognitive preference to engage in the focal task.

5.2.1.1 Reappraisal Affordances

Uusberg et al. (2019) argue that in principal "[a]ffordances for reappraisal arise from the range of mental models that could explain a situation (construal malleability) and the range of goals that the situation could serve (goal set malleability)" (p. 1). The authors furthermore state that "[c]onstrual malleability is high, when an individual can choose from several mental models that would explain the situation comparably well. […] Goal set malleability is high when people are equally committed to several goals" (Uusberg et al., 2019, p. 9). With regard to instances of insufficient motivation, I suggest that construal malleability might be relatively low because insufficient motivation refers to instances of controlled/have-to motivation and, therefore, to subjectively controlled situations; in contrast, however, goal sets are generally speaking quite malleable (see Kruglanski et al., 2002).

5.2.1.2 Activities in the Scope of the Process

There are two alternative reappraisal activities/strategies involved in the reappraisal process: repurposing and reconstrual (cf. Uusberg et al., 2019). Whereas repurposing changes the appraisal outcome by connecting the focal situation to other goals, reconstrual involves changing how the person views the focal situation.

From an incentive theory perspective (e.g., Baumann & Heckhausen, 2018; Rheinberg & Engeser, 2018), *repurposing* refers to discovering and visualizing new (otherwise overlooked) purpose-related positive incentives for engaging in the focal activity, in other words, perceiving the activity in relation to these additional incentives ("Working on this boring task will train my attention and concentration which could be useful for exams."; "When I get up and go running, it will help me to establish a habit which has long-term benefits for my health"; "When I wash the dishes, it will make my wife happy").

Reconstrual, however, refers to discovering and visualizing new activity-related positive incentives and perceiving the activity in relation to these incentives ("This monotonous

vigilance task is like a game", "At least I am free to decide where to start with this assignment"; "By participating in this experiment, I contribute to gaining knowledge, which I value a lot.").

However, the effectiveness of these reappraisal sub-strategies depends on the kind of motives that correspond to the incentives additionally perceived. The key is to perceive an (otherwise insufficiently motivated) activity's "value in connection with what already has significance" (Dewey, 1913, p. 23). More specifically, as various theories suggest, the experience as well as the behavior's form depends on the additional motives' motivation quality. Regarding this issue, repurposing could relate to, for example, self-generating autonomous rationales (self-determination theory, e.g., Ryan & Deci, 2020), self-concordant goals (self-concordance model, e.g., Sheldon, 2014), attainment value (expectancy-value theory, e.g., Priniski et al., 2018), identity-value (identity-value model, e.g., Beckman et al., 2017) or to connecting the focal behavior to need-congruent goals (motive-disposition theory, e.g., Brunstein, 2018; Grund et al., 2018). However, reconstrual could relate to, for example, discovering intrinsic rationales (self-determination theory, e.g., Ryan & Deci, 2020), intrinsic value (expectancy-value theory, e.g., Priniski et al., 2018) or arousing implicit motives (motive-disposition theory, e.g., Brunstein, 2018).

5.2.1.3 Mechanisms in the Scope of the Process

Whereas reappraisal can enfold via reconstruing or repurposing, Uusberg et al. (2019) argue for a fundamental mechanism that yields the effect: a shift of the initial appraisal along the appraisal dimensions *desirability*, *attribution* and *expectancy*. The resulting shift along the appraisal dimensions is termed appraisal change vector (cf. Uusberg et al., 2019).

In motivational terms, the meta-dimension desirability relates to subjective value (e.g., Eccles & Wigfield, 2002; McClelland et al., 1989; Ryan & Deci, 2000; 2008), while attribution as well as expectancy, however, relates to subjective feasibility in respect of the focal activity (Bandura, 1997; Eccles & Wigfield, 2002; Kehr, 2004; Stiensmeier-Pelster & Heckhausen, 2018). Whereas desirability, attribution and expectancy influence motivational states (see Heckhausen & Heckhausen, 2018), positive reappraisal as a volitional strategy addresses the desirability meta-dimension. In this regard, I suggest that positive reappraisal increases the activity's desirability either by discovering activity-related positive incentives (reconstrual) or by connecting the activity to purpose-related positive incentives (repurposing). The initial appraisal of the activity is shifted on the desirability appraisal dimension, which shapes the concrete motivational experience. However, whereas an activity's desirability can be increased either via increasing motivation quantity or motivation quality toward the focal activity, the latter compared to the former will lead to more-positive outcomes (e.g., Howard et al., 2017; Priniski et al., 2018).

Various theory-based mechanisms can be utilized to explain the effect of positive reappraisal on motivation and associated outcomes. The mechanism proposed depends on the motivation theory researchers draw on. In this regard, I will exemplary discuss three motivational theories below: self-determination theory (Ryan & Deci, 2000; 2008), motive-disposition theory (McClelland, 1985), and expectancy-value theory (Eccles & Wigfield, 2002).

Self-determination theory (Ryan & Deci, 2000; 2008) takes the effects of changes in motivation quantity as well as motivation quality into account; accordingly, it implies that various appraisal change vectors can map a shift in appraisal outcomes on the desirability meta-dimension. With regard to appraisal change vectors relating to motivation quantity, self-determination theory refers to changes in the magnitude of intrinsic motivation, as well as in the magnitude of various types of extrinsic motivation (integrated/identified/introjected/external regulation). With regard to motivation quality, self-determination theory suggests the internalization process as an appraisal change vector. According to the theory, fostered internalization corresponds to enhanced autonomous motivation, increased self-determination (Ryan & Deci, 2000) and self-relevance perceptions (Vansteenkiste et al., 2018), as well as greater self-concordance (Sheldon 2014; Sheldon & Schüler, 2011). In accordance with predictions derived from the theory, research drawing on self-determination theory demonstrates that higher motivation quality generally results in more positive outcomes compared to higher motivation quantity (e.g., Howard et al., 2016; Ryan & Deci, 2000; 2008; 2020; Steingut et al., 2017; Van den Broek et al., 2021).

Motive-Disposition Theory (McClelland, 1985) suggests that implicit as well as explicit motives can vary in their strength; furthermore it proposes that implicit and explicit motives can vary with regard to their congruence/discrepancy in respect to a given activity (e.g., Brunstein, 2018; Kehr, 2004). Thus, appraisal change vectors relating to motivation quantity refer to changes in implicit/explicit motive salience, whereas appraisal change vectors relating to motivation quality refer to changes in motive-congruence. Taking this theory and related research into account, repurposing, for example, could involve connecting the focal activity to explicit motives encompassing implicit motives such as personal goals (Austin & Vancouver, 1996) or visionary images (Rawolle et al., 2017). Regarding this issue, Brunstein (2018) stated that “[i]f self-generated goals exhibit incentives that are compatible with strongly developed (implicit) motives, the respective incentives are affectively enhanced, in accordance with the idea that the valence of a goal is equivalent to the multiplication of incentive and motive“ (Brunstein, 2018, p. 389). In line with this, studies show that higher motive congruence is associated with an energizing effect through the involvement of aroused implicit motives as well as with increased well-being (e.g., Baumann et al., 2005; Brunstein, 2010; Brunstein,

2018; Schultheiss, Jones, Davis, & Kley, 2008), implicit self-regulation (Müller & Rothermund, 2017), and better performance (e.g., Gröpel & Kehr, 2013).[30]

According to *expectancy-value theory* (Eccles & Wigfield, 2002), people can appraise an activity or a task according to different types of value such as utility value or attainment value (see for example, Acee, Weinstein, Hoang, & Flaggs, 2018; Hulleman et al., 2017; Priniski et al., 2018). As these types of value can vary in their magnitude, as appraisal dimensions they also map appraisal change vectors. However, Priniski et al. (2018) emphasized that these types of task value also differ qualitatively and introduced the relevance continuum. Accordingly, attainment value, compared to utility value, relates more strongly to personal meaningfulness (see also Priniski et al., 2018). The authors claim that "more-personally-meaningful relevance connections should generally be more powerful determinants of behavior" (p. 14). Thus, the relevance continuum suggests that qualitatively different types of value have different effects and, hereby, provide another potential mechanism.[31] However, previous research in this field (see Harackiewicz et al., 2016) has largely neglected the role of type of value. More recently, this issue has attracted attention in the field of research grounded in expectancy-value-theory (e.g., Priniski et al., 2018) and has resulted in a call for next steps in intervention research beyond utility value (Rosenzweig et al., 2022).

Taken together, I propose that strategies from questionnaire-based studies that are similar to positive reappraisal (e.g., enhancement of personal significance, Schwinger et al., 2007), refer to this process and can involve repurposing and/or reconstrual. My integrative framework of positive reappraisal as a volitional strategy suggests that positive reappraisal via reconstrual facilitates intrinsic motivation and, thereby, influences related outcomes such as fun; positive reappraisal via repurposing, however, can facilitate external, introjected, identified or integrated regulation respectively, depending on the incentive's motivation quality, and, thereby, influences related outcomes.

In sum, I suggest that both, increases in motivation quantity (/value magnitude/motive strength) as well as increases in motivation quality (/internalization/motive-congruence/relevance) can be mapped as appraisal change vectors and mediate the effect of positive reappraisal as a volitional strategy. In general, however, increasing motivation quality is expected to lead to more-adaptive outcomes in instances of insufficient motivation compared

[30] Brunstein (2018) argues that a "self-determined approach to goal setting" (p. 395) helps to attune explicit goals to implicit motives. Grund and colleagues (2018) pursue a similar approach and suggest that autonomous forms of motivation mirrors motivation congruence "in terms of functional effects for self-regulation" (p. 444).

[31] There is another model which is grounded in expectancy-value theory that also provides theoretical mechanisms: the value-reappraisal model by Acee et al., (2018). Its suggests that self-generated rationales produce relevance connections which elicit cognitive-affective responses that lead to attitude change; this, in turn, affects motivational and self-regulatory outcomes.

to increasing motivation quantity (see for example Brunstein, 2018; Priniski et al., 2018; Van den Broek et al., 2021).

5.2.1.4 Effectiveness on Proximal and Distal Outcomes

When successfully implemented, positive reappraisal positively changes motivational states and, thereby, supports cognitive preferences. The effectiveness of positive reappraisal as a volitional strategy is generally reflected in increased motivation (quantity and/or quality) and, accordingly, in associated well-being-related and behavioral outcomes.

Regarding the strategy's effectiveness, I propose that an implementation of positive reappraisal via repurposing enhances the appraisal meta-dimension desirability by connecting the otherwise insufficiently motivated activity to additional motives corresponding to more-motivating purpose-related positive incentives than the ones that were initially salient. Incentives corresponding to motives of high motivational quality enhance the activity's personal meaningfulness (i.e., proximal outcome) and, thereby, are generally expected to be more effective regarding most associated outcomes compared to incentives corresponding to motives of low motivation quality (see for example, Brunstein, 2018; Priniski et al., 2018; Vansteenkiste et al., 2018). However, in chapter 5.1.1.3 I discussed that whereas higher motivation quality generally positively affects well-being related outcomes, motivation quality might be less important for some behavioral outcomes such as performance in an easy task (see also Van den Broek et al., 2021).

Furthermore, I propose that an implementation of positive reappraisal via reconstrual enhances the appraisal meta-dimension desirability by connecting the otherwise insufficiently motivated activity to additional motives corresponding to more-motivating activity-related positive incentives (fundamental psychological needs/intrinsic value/implicit motives). As a consequence, the reappraisal outcome will be associated with need-satisfaction, enhanced enjoyment and/or interest (Wolters & Benzon, 2013; Sansone et al., 1992; Sansonse & Thoman, 2005; Thoman et al., 2017) and, thus, with intrinsic motivation toward the focal activity (e.g., Ryan & Deci, 2020).

5.2.1.5 Determinants of the Effectiveness

In the following I will briefly discuss person-related factors (including reappraisal-related features) and situation-related factors that potentially determine the strategy's effectiveness.

M*indfulness* seems to be a highly important moderator for the effectiveness of positive reappraisal (e.g., Pagnini & Langer, 2015; Smyth et al., 2020).[32] Previous findings suggest that mindfulness might help to realize construal-/goal set malleability, because it broadens awareness (e.g., Garland et al., 2015). Moreover, results suggest that mindfulness supports reappraising the focal activity in relation to more-autonomous reasons (e.g., Donald et al., 2020; Smyth et al., 2019; see chapter 5.1.3.3): Higher (vs. lower) states of mindfulness increase the likelihood to relate the focal activity to psychological needs, personal values and personally meaningful goals in the scope of positive reappraisal (e.g., Brown & Ryan, 2003; Donald et al., 2020; Smyth et al., 2020). Furthermore, I suggest that motivational competence is a potential moderator. *Motivational competence* (see Rheinberg & Engeser, 2010) refers, among other things, to a person's knowledge about his/her affective and cognitive preferences and thereby determines whether a person successfully discovers motives which are truly personally meaningful. The more motivational competent people are, the easier it should be for them to connect the focal activity to their affective and cognitive preferences (cf. Grund et al., 2018; Kehr, 2004). However, the strategy's effectiveness will be also influenced by reappraisal-related features such as content (*motivation quality of the motive* that corresponds to the incentive additionally perceived), specificity (abstract vs. concrete; see chapter 5.1.3.4.). Regarding the new appraisal's content, for example, I suggest that repurposing should have stronger effects on desirable outcomes, the more it involves autonomous rationales (self-determination theory, e.g., Ryan & Deci, 2020; Steingut et al., 2017), self-concordant goals (self-concordance model, e.g., Sheldon, 2014), attainment value (expectancy-value theory, e.g., Priniski et al., 2018), identity-value (identity-value model, e.g., Beckman et al., 2017) or connecting the focal behavior to need-congruent goals (motive-disposition theory, e.g., Brunstein, 2018; Grund et al., 2018). However, reconstrual should have a stronger motivational effect, the more it involves discovering intrinsic rationales (self-determination theory, e.g., Ryan & Deci, 2020), intrinsic value (expectancy-value theory, e.g., Priniski et al., 2018) or the arousal of implicit motives (motive-disposition theory, e.g., Brunstein, 2018). Moreover, I propose that *outcome expectation* (Bandura, 1997) determines the effect of newly discovered and visualized positive incentives on any given outcome. More specifically, I propose that shifting appraisal outcomes via positive reappraisal is only effective if the person is actually convinced that the activity at hand can be instrumental in achieving a personally meaningful goal (see also Kazén et al., 2015; Rheinberg & Engeser, 2018). Consequently, I claim that while simply indulging in a positive fantasy is not enough (Oettingen & Reininger, 2016; Oettingen & Mayer, 2002), a positive outcome expectation (Bandura, 1997) moderates the strategy's

[32] Note that there also is strong evidence that mindfulness has a beneficial effect with regard to the identification of a motivational barrier (see Dane & Brummel, 2013; Elkins-Brown, Teper, & Inzlicht, 2017; Friese & Hofmann, 2016; Grund et al., 2015; Hanley et al., 2015; Myrseth & Fishbach, 2009). Thus, greater mindfulness is conducive to self-regulation (Wolters, 2013).

effectiveness. Finally, *incentive salience* is crucial for the strategy's effectiveness. In other words, a successful deployment of positive reappraisal is only effective when the newly discovered incentive is salient when it comes to initiating or persisting in the otherwise insufficiently motivated behavior.

In addition, there are some situation-related factors that can influence the strategy's effectiveness. Meta-analytical findings from Steingut et al. (2017) suggest, for example, that positive reappraisal as a volitional strategy should have a more powerful positive effect on engagement when the activity is rather uninteresting. However, there might be occasions when the strategy is implemented successfully, but remains ineffective.[33] The chance of the deployment of positive reappraisal actually being effective depends on its functionality in a given situation (see Bonanno & Burton, 2013; Haines et al., 2016; Troy et al., 2013; Vishkin et al., 2019). In this regard, I propose that *controllability* (Troy et al., 2013) as well as the focal activity's *demand characteristics* (Hennecke et al., 2019) most likely plays a crucial role. Whereas previous findings from emotion-regulation research suggest that positive reappraisal should be functional in situations of low (vs. high) controllability, there is also much to suggest that the focal activity's demand characteristics determine its functionality (see chapter 5.1.3.1 and chapter 5.1.3.2). This applies, for example, to demanding activities in terms of difficulty because perceived difficulty shapes expectancy appraisals. Regarding this issue, theoretical considerations (e.g., Eccles & Wigfield, 2002; Kehr, 2004) as well as strong empirical evidence (e.g., Canning & Harackiewicz, 2015; Kazén et al. , 2015; Hulleman et al., 2010) support the notion that *expectancy of success* or, in other words, the confidence to perform well ("Do I have the abilities I need for mastering the activity?"), moderates the effectiveness of a successfully deployed positive reappraisal strategy. Low expectations of success can undermine motivation even when affective and cognitive preferences toward the focal task are high (cf. Kehr, 2004). Thus, just as desirability as well as feasibility appraisals influence emotional reactions (Uusberg et al., 2019), they also influence motivation (Duckworth et al., 2014; 2016). In instances where insufficient motivation and (e.g.) low expectation of success coincide, deploying positive reappraisal alone might be not helpful (cf. chapter 5.1.3.2). Similarly, implementing positive reappraisal alone might be unhelpful when people face aversive activities which elicit negative emotions such as fear; these instances call for the additional deployment of emotion-regulation strategies (see Ford & Troy, 2019).

[33] In general, there are certain antecedents for effectively implementing volitional strategies (Wolters & Benzon, 2013). First, people need to identify the motivational barrier (e.g., Myrseth & Fishbach, 2009). Then , when they feel the need to regulate the motivational problem, they need to decide where to aim (Schwinger et al., 2012): changing the situation by implementing situational strategies or changing "themselves" by implementing attentional deployment or cognitive change strategies (Duckworth et al., 2016). In other words, people need to select a strategy which is functional in that specific instance (Wolters & Benzon, 2013). Furthermore, they need to be able to implement the strategy successfully and, thereafter, monitor its effect (Wolters & Benzon, 2013).

Taken together, the integrative framework of positive reappraisal as a volitional strategy shows that this strategy refers to a process consisting of several components. Moreover, it suggests that its successful deployment and its effectiveness do not always go hand in hand (cf. Ford et al., 2017). Situation-related factors (e.g., controllability) determine when the strategy is helpful and potentially effective; however, person-related factors are crucial for the strategy's successful deployment as well as for its effectiveness (e.g., mindfulness and outcome expectation). Finally my integrative framework suggests that positive effects can be expected when the strategy is implemented in an adequate situation and when the reappraisal process results in appraising the focal activity as a mean to the satisfaction of needs, the realization of values or the achievement of personal goals respectively.

5.2.2 Future research directions

In light of the discussion in respect of this integrative framework as well as in respect of my findings regarding the effectiveness of self-generating autonomous rationales (see chapter 5.1), I provide suggestions for future research in the following.

5.2.2.1 Controlling for Insufficient Motivation

We can only consider positive reappraisal to be effective, if it helps to overcome instances of insufficient motivation (cf. Kehr, 2004). As described in chapter 3.1.4, I argue that insufficient motivation refers to instances where purpose-related incentives motivate the focal behavior and activity-related incentives are absent or negative; in terms of self-determination, it relates particularly to instances where a person's motivation toward an activity is controlled and autonomous rationales are not salient or even lacking (i.e., low motivation quality).

It is unclear, however, whether different levels of these different components of insufficient motivation influence the effectiveness of positive reappraisal. For example, overcoming instances that involve strong, negative incentives (i.e., strong aversion) might require the deployment of emotion-regulation strategies (Hennecke et al., 2019) prior to or in addition to positive reappraisal (regarding this issue see also Ford, Gross, & Gruber, 2019).

According to this conceptualization of insufficient motivation, its strength would increase as a function of controlled motivation quantity. Regarding this issue, future researcher could vary the strength of insufficient motivation and examine the strategy's effectiveness accordingly.

5.2.2.2 Strengthening the Manipulation

As I have discussed above, researchers in future studies could optimize the manipulation to implement positive reappraisal regarding its strength.

In the current research, I used three different variations (Study 1, Study 4 and Study 5) of prompting participants to self-generate autonomous rationales in instances of insufficient motivation (i.e., implementing positive reappraisal). Future research could compare such variations and investigate what kind of manipulation yields the strongest effects.

In this regard, it should aim at participants self-generating truly self-relevant rationales. In general, organismic integration theory (e.g., Ryan & Deci, 2020) suggests that the key for its effectiveness lies in self-relevance perceptions. Whereas "I will get a lot of money" might help to engage in an otherwise insufficiently motivated behavior, reappraisals concerning thoughts like "I can provide my family with this work and will invest in a wonderful holiday" would have greater positive effects on most outcomes. In future experimental studies, prompting people to self-generate autonomous rationales could help them to discover whether engaging in the focal activity satisfies psychological needs (intrinsic regulation), why it is identity-relevant to engage in or to complete it (integrated regulation), or in what way it is personally important (identified regulation).[34]

My integrative framework suggests that realizing that one experiences competence and autonomy in completing an easy and otherwise boring task through reconstrual compared to appraising the focal task in relation to personally meaningful goals (i.e., repurposing) should be generally speaking more effective on most outcomes (Ryan & Deci, 2008); however, according to organismic integration theory, the deployment of positive reappraisal which leads to intrinsic regulation should be as effective as one which leads to integrated regulation (Ryan & Deci, 2019, 2020).

While self-generated autonomous rationales would generally need to prevail initial controlling rationales to lead to positive effects (see Thibault Landry, Zhang, Papachristopoulos, & Forest, 2020; Van den Broek et al., 2021), they also need to be salient during activity engagement; thus, in experimental (field) studies, researchers would need to assure that participants visualize them in the action phase.

5.2.2.3 Examining the Mechanisms in More Detail

In my research I proposed internalization as the mechanism which can explain the effect of self-generated autonomous rationales in instances of insufficient motivation. Whereas

[34] Such self-relevant rationales can relate to aspects about the person herself/himself (e.g., needs, values, personally meaningful goals), to other people that the person feels related to or even transcend the self (Priniski et al., 2019; Yeager et al., 2014).

I assessed internalization as an outcome, future research could scrutinize the internalization process in relation to effective positive reappraisal. Regarding this process, Vansteenkiste et al. (2018) state that it “requires two crucial ingredients: (1) an understanding of why the uninteresting activity is useful, valuable, and important to one’s self-functioning and (2) an experience of satisfaction of all three psychological needs during both the contemplation and the engagement of that activity” (Vansteenkiste et al., 2018, p. 37). Thus, future experimental research should account for these different features. Furthermore, it could consider that the construct of internalization might relate to a cognitive valuation process (Berkman et al, 2017; Francis & Inzlicht, 2016; Uusberg et al., 2019).

Another interesting question that researchers might explore in the future is how long a one-time internalization through positive reappraisal persists and how the strategy must be reapplied in a similar situation to maintain the activity in question. Just because thinking about your spouse's joy once helped you clear the dishwasher doesn't mean that this activity is permanently internalized as a result and will be a given the next time you see it.

5.2.2.4 Refining the Measurement of Outcomes

Whereas from a theoretical perspective the use of the composite score is well justified with regard to the assessment of autonomous motivation (cf. Study 4 & 5), future research may consider more detailed methodological approaches. Findings from recently published studies (Howard et al., 2020; Van den Broek et al., 2021) suggest assessing regulatory styles separately instead of using composite scores.

Future research could furthermore benefit from differentiating outcomes in the pre-action and in the action phase (cf. Engelschalk et al., 2016). Moreover, the strategy’s effectiveness on the outcomes of interest will vary depending on whether the person deploying the strategy is contemplating/anticipating an upcoming insufficiently motivated behavior or is already engaging in it (cf. Quoidbach, Mikolajczak, & Gross, 2015).

5.2.2.5 Controlling for Moderators

As I have discussed in chapter 5.2.1.5, the positive reappraisal process needs to be considered in context; it is reasonable to assume that there are several potential determinants of positive reappraisal’s effectiveness. I propose that positive reappraisal is generally more effective in situations of low (vs. high) controllability and more effective with regard to some types of activity demands (i.e., boring) compared to others (e.g., emotionally challenging). Metacognitive knowledge (Bürgler et al., 2021), however, most likely affects whether a person selects the strategy when adequate and whether he/she will deploy it successfully. Moreover, I recommend taking trait/state mindfulness as well as expectancy for success toward the

insufficiently motivated activity into account. More specifically, future research could, for example, investigate whether mindfulness has a facilitating effect on successfully self-generating rationales which are truly self-relevant/autonomous (cf. Smyth et al., 2020). Regarding the expectancy of success, future research could vary levels of task difficulty and then assess the interaction of autonomous forms of motivation brought about through the self-generation of autonomous rationales and expectancy for success on the outcome of interest.

5.2.2.6 Choosing Other Methods

In order to investigate the effectiveness of positive reappraisal, I prompted participants to self-generate autonomous rationales in instances of insufficient motivation in four experimental lab studies as well as in a quasi-experimental field study.

With respect to future experimental studies, I suggest two adaptations: First, researchers could test the effectiveness of self-generated autonomous rationales relative to self-generated controlling rationales in instances of insufficient motivation. This approach could directly test the hypothesis that in such instances, increasing motivation quality is actually more important regarding most outcomes compared to increasing motivation quantity. Second, I recommend to test the effectiveness of positive reappraisal against adopting an outcome focus as another treatment condition. This procedure would highlight the different effects of rethinking rationales and reaffirming rationales.

Moreover, in future studies, researchers could go beyond prompting people to deploy the strategy in experimental settings and choose other approaches in order to expand the field's understanding of the strategy's effectiveness. Regarding this issue, they could, for example, measure the tendency to deploy the strategy in correlational studies (see, for example, enhancing personal significance, Schwinger et al., 2012) or assess spontaneous strategy deployment using the experience sampling method. Regarding the latter I recommend asking participants to report their use of positive reappraisal since the last signal (cf. Haines et al., 2016). Investigating within-person covariation between positive reappraisal and variables such as controllability (cf. Haines et al., 2016) or expectancy for success would allow for the development of a deeper understanding of how positive reappraisal works. Finally, in future studies researchers could teach people about adequate implementation of positive reappraisal and furthermore train them how to deploy the strategy effectively; in quasi-experiments they could thereafter analyze the trainings effect enfolding over time.

5.3 Implications for Practice

In everyday life, insufficient motivation may sometimes sign that it is time to quit an activity or to abandon a goal (cf. Westgate, 2020). However, other times – for example during studies or employment – people feel that they cannot leave the situation or they are not willing to do so because they want to pursue a goal no matter what. Every job contains parts that are tedious; pursuing a degree involves learning subjectively uninteresting course material; physical fitness requires continuous exercise. In such instances, the implementation of positive reappraisal can be extremely helpful.

With the current work, I demonstrated that people can successfully be prompted to self-generate autonomous rationales which shows that people can be supported to deploy positive reappraisal. In practice, this could be done either by a) being encouraged to use the strategy at crucial moments, or b) by learning when and how to utilize the strategy.

Consequently, beyond providing rationales (see for example, Cheon, Reeve & Vansteenkiste, 2020; Slemp et al., 2018), managers could help their employees and teachers can help their students to discover personal meaning in instances of insufficient motivation. They could do so by asking them questions that encourage the deployment of positive reappraisal. More specifically, they could ask questions such as “Can you relate this task to something that is really important to you?”.

Moreover, previous research suggests that the ability to implement positive reappraisal can be trained (e.g., McRae et al., 2012; Zeier, Sandner, & Wessa, 2019). This means that in practice, not only organizations and - on an interpersonal level - (e.g.) managers can foster experiences of meaningful work (e.g., Lysova, Allan, Dik, Duffy, & Steger, 2019; Slemp et al., 2018; Vansteenkiste et al., 2018), but people can discover and foster personal meaning at work themselves through the implementation of positive reappraisal. In the following I will propose a training program aimed at equipping employees/students with the knowledge and skills required to implement positive reappraisal effectively. This will essentially be the case, when people deploy it successfully in instances where its implementation is functional (Ford et al., 2017; Ford & Troy, 2019). My integrative framework (see chapter 5.2.1) suggests that effective training programs take into account that positive reappraisal is a multi-component process. Accordingly, I will briefly outline the content that the training should provide to be effective. First, people would need to learn when strategy deployment is potentially (un)helpful (cf. Ciarrochi et al., 2022). This includes the ability to identify instances of insufficient motivation (Wolters, 2013), for example by learning to assess motivational states applying the 3C-model (e.g., Kehr et al., 2018). Furthermore, it includes the ability to recognize situation-strategy fit (e.g., Bürgler et al., 2021; Haines et al., 2016) and select positive reappraisal when adequate (Wolters, 2013). Regarding this issue, people would need to learn that positive reappraisal is not always helpful (cf. Bonanno & Burton, 2013; Ford et al., 2019; Troy et al., 2013). With

respect to procrastination, for example, people may require problem solving strategies when subjective abilities are too low (see Kehr, 2004), or emotion-regulation strategies when the aversive feeling immanent to the activity is too strong (e.g., Eckert, Ebert, Lehr, Sieland, & Berking, 2016), in addition to the deployment of positive reappraisal. People should also learn that its deployment is not useful in situations which are controllable (Troy et al., 2013; Troy et al., 2017); here, situational strategies can be expected to be more effective (Duckworth et al., 2016). Moreover, there can also be negative aspects of positive reappraisal (cf. Ford et al., 2019). When a person executes positive reappraisal, but there is no situation-strategy-fit (Vishkin et al., 2020), it might be frustrating or even demotivating. An indiscriminate implementation of positive reappraisal could furthermore lure people to overwork and neglect self-care. For example I will use the case of a lawyer who works in a large law firm. For years, he has gone without breaks and vacations, but receives a very good salary in return. In instances of insufficient motivation, he could ask himself: “Is pursuing my work at this firm still worthwhile or have my priorities changed?”. If he decides that goal pursuit is still worthwhile, then successful implementation of positive reappraisal might help him to feel more motivated (see also Schwinger & Stiensmeier-Pelster, 2012). Ultimately, insufficient motivation provides data: “I don’t want to do that right now”. Thus, training should help people to learn to decide whether pursuing the activity is actually worthwhile or whether it would be a wise decision to modify the situation (situational strategies) or even to disengage from goal pursuit.

Additionally, people would need to learn how to deploy positive reappraisal successfully. In this respect, my integrative framework can help to acquire an understanding of the multi-step process. In addition to understand and practicing the positive reappraisal process, it should be advantageous to improve mindfulness (Garland et al., 2017) as well as motivational competence (Grund et al., 2018): Training positive reappraisal and mindfulness in combination could lead to an “upward spiral” as findings from emotional regulation research suggest (Garland et al., 2011). Moreover, it might be advantageous to first accept the motivational barrier and then execute the strategy (Ford et al., 2018). As effective positive reappraisal involves appraisals relating the focal activity to personally meaningful/self-relevant aspects, people could benefit from learning about and improving their motivational competence (Grund et al., 2018).

Finally, the participants would need to learn to monitor whether or not the strategy actually helped to overcome insufficient motivation and supported activity engagement/goal pursuit (cf. Wolters & Benzon, 2013; McRae & Gross, 2020; Milyavskaya et al., 2018).

5.4 Conclusion

This work is the first that systematically examines the effectiveness of positive reappraisal as a volitional strategy. Thereby, it contributes to a deeper understanding of when and how positive reappraisal can help in overcoming instances of insufficient motivation. Generally speaking, my findings underscore the notion that relating the focal behavior to personally meaningful rationales is crucial with respect to the strategy's effectiveness. However, I also found that increased motivation quality drives the effect on most but not on all outcomes (e.g., performance in easy tasks). Moreover, my findings show that positive reappraisal is not effective for all people in all instances of insufficient motivation. Person-related factors such as mindfulness and situation-related factors such as controllability might additionally determine its effectiveness. Furthermore, I conclude that positive reappraisal alone may not suffice to overcome each instance of insufficient motivation (cf. Kobylinska & Kusev, 2019): instances of strong aversion may additionally require emotion-regulation strategies (Ford et al., 2019) and instances of inadequate ability may additionally require problem-solving strategies (Kehr, 2004).

While pioneering, due to its focus on positive reappraisal as a volitional strategy, the current work adds to self-regulation and motivation research. More specifically, my experimental studies expand on correlational findings with regard to conceptually similar strategies such as enhancement of personal significance (e.g., Schwinger et al., 2009; Grunschel et al., 2016) by examining when and how positive reappraisal is effective. Moreover, to my knowledge, in self-determination theory literature, my research is the first to investigate self-deployed processes affecting motivation apart from socio-environmental factors. My findings may inspire future research in this field. Furthermore, the current work may inspire research on the effectiveness of utility value interventions to take motivation quality into account in addition to ability beliefs (see also Rosenzweig et al., 2022).

Regarding future research, I encourage replication of my findings that are in line with the hypotheses (see Study 1 and Study 4) and elaborated several recommendations that future studies could address. My integrative framework may be of help in this regard. It shows that positive reappraisal as a volitional strategy is a process of change in appraisal outcomes and helps to gain a more granular understanding of when it can be expected to be effective and what should drive its effect.

In sum, I conclude that positive reappraisal as a volitional strategy is potentially effective in instances of insufficient motivation where changing the situation is not an option and the activity seems feasible; it unfolds its potential when the focal behavior gets reappraised in relation to psychological needs or personally meaningful motives.

Zusammenfassung [Summary]

Kann die Neubewertung eines unzureichend motivierten Verhaltens die Motivation für dieses Verhalten steigern? Während zahlreiche Forschungsarbeiten bereits belegen, dass die positive Neubewertung als Emotionsregulationsstrategie sehr effektiv ist, wurde ihre Wirksamkeit als volitionale Strategie zur Überwindung unzureichender Motivation noch nicht systematisch untersucht. In der vorliegenden Arbeit habe ich 1) die positive Neubewertung als volitionale Strategie konzeptualisiert und 2) die Wirksamkeit der Strategie empirisch untersucht. Zu diesem Zweck habe ich das Prozessmodell der Selbstregulation (Duckworth et al., 2014) mit der multidimensionalen Konzeptualisierung von Motivation aus der Selbstbestimmungstheorie (z. B. Ryan & Deci, 2000; 2020) kombiniert. Die Effektivität der Strategie habe ich operationalisiert, indem ich die Effektivität von selbstgenerierten autonomen Beweggründen in Situationen kontrollierter Motivation untersuchte. Darüber hinaus habe ich den Vorschlag gemacht, dass der Internalisierungsprozess als Mechanismus die Wirkung der Strategie erklären kann. Ich führte vier Laborstudien sowie eine Feldstudie mit der Experience Sampling-Methode durch. In jedem Experiment forderte ich die Teilnehmer*innen auf, entweder selbst autonome Gründe für die Ausübung einer kontrolliert-motivierten Tätigkeit zu generieren oder die Tätigkeit zu beschreiben, und untersuchten mehrere motivationsbezogene Variablen. In manchen (aber nicht in allen) Studien fand ich in Übereinstimmung mit meinen Hypothesen, dass die Generierung autonomer Beweggründe in Fällen kontrollierter Motivation Interesse/Freude, den subjektiven Wert der Aufgabe und autonome Motivation für die vorliegende Aktivität sowie die subjektive Vitalität (indirekt) fördern kann. Darüber hinaus fand ich Unterstützung für die Annahme, dass die Internalisierung die Wirksamkeit der Strategie erklären kann. Diese Arbeit liefert somit erste Erkenntnisse darüber, wann und wie eine positive Neubewertung die Motivation für ein ansonsten unzureichend motiviertes Verhalten steigern kann. Ich erörtere die Ergebnisse in Verbindung mit meinen Null-Befunden und mit methodischen Punkten, die in zukünftiger Forschung behandelt werden können. Um den aktuellen Stand der Forschung zusammenzufassen und Anregungen für künftige Forschungen zu geben, stelle ich abschließend einen integrativen Bezugsrahmen für die Strategie der positiven Neubewertung vor, der den Prozess und die Wirksamkeit der Strategie in nuancierter Weise beschreibt. Dieser Rahmen legt nahe, dass die positive Neubewertung als volitionale Strategie mehrere Komponenten umfasst und dass verschiedene situations- und personenbezogene Faktoren ihre Wirksamkeit bestimmen.

Auf der Grundlage meiner Befunde sowie der aus dem integrativen Bezugsrahmen abgeleiteten Empfehlungen komme ich zu dem Schluss, dass die positive Neubewertung als volitionale Strategie vor allem dann wirksam sein sollte, wenn man die Situation nicht ändern kann oder will und wenn die vorliegende Aktivität durchführbar erscheint.

References

Acee, T. W., Weinstein, C. E., Hoang, T. V., & Flaggs, D. A. (2018). Value Reappraisal as a Conceptual Model for Task-Value Interventions. *The Journal of Experimental Education, 86*(1), 69-85. https://doi.org/10.1080/00220973.2017.1381830

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*(2), 217-237. https://doi.org/10.1016/j.cpr.2009.11.004

American Psychological Association. (n.d.). Appraisal. *APA Dictionary of Psychology.* Retrieved from https://dictionary.apa.org/appraisal

Austin, J. T., & Vancouver, J. B. (1996). Goal constructs in psychology: Structure, process, and content. *Psychological Bulletin, 120*(3), 338–375. https://doi.org/10.1037/0033-2909.120.3.338

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Baten, E., Vansteenkiste, M., De Muynck, G.-J., De Poortere, E., & Desoete, A. (2020). How can the blow of math difficulty on elementary school children's motivational, cognitive, and affective experiences be dampened? The critical role of autonomy-supportive instructions. *Journal of Educational Psychology, 112*(8), 1490-1505. https://doi.org/10.1037/edu0000444

Bäulke, L., Daumiller, M., & Dresel, M. (2021). The role of state and trait motivational regulation for procrastinatory behavior in academic contexts: Insights from two diary studies. *Contemporary Educational Psychology, 65*, 101951. https://doi.org/10.1016/j.cedpsych.2021.101951

Baumann, N., Kaschel, R., & Kuhl, J. (2005). Striving for unwanted goals: Stress-dependent discrepancies between explicit and implicit achievement motives reduce subjective well-being and increase psychosomatic symptoms. *Journal of Personality and Social Psychology, 89*(5), 789–799. https://doi.org/10.1037/0022-3514.89.5.781

Baumeister, R. E., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego Depletion: Is the Active Self a Limited Resource? *Journal of Personality and Social Psychology, 74*(5), 1252-1265. https://doi.org/10.1037/0022-3514.74.5.1252

Beckmann, J., & Heckhausen, H. (2018). Motivation as a function of expectancy and incentive. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and action* (3 ed., pp. 163-220). Cham: Springer.

Beedie, C. J., & Lane, A. M. (2012). The role of glucose in self-control: another look at the evidence and an alternative conceptualization. *Pers Soc Psychol Rev, 16*(2), 143-153. https://doi.org/10.1177/1088868311419817

Berkman, E. T., Livingston, J. L., & Kahn, L. E. (2017a). The Identity-Value Model of Self-Regulation: Integration, Extension, and Open Questions. *Psychological Inquiry, 28*(2-3), 157-164. https://doi.org/10.1080/1047840x.2017.1343069

Berkman, E. T., Livingston, J. L., & Kahn, L. E. (2017b). Finding the "self" in self-regulation: The identity-value model. *Psychological Inquiry, 28*(2-3), 77-98. https://doi.org/10.1080/1047840X.2017.1323463

Bertrams, A., Dyllick, T. H., Englert, C., & Krispenz, A. (2020). German Adaptation of the Subjective Vitality Scales (SVS-G). *Open Psychology, 2*(1), 57-75. https://doi.org/10.1515/psych-2020-0005

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., . . . Devins, G. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(230-241). https://doi.org/10.1093/clipsy.bph077

Blunt, A. K., & Pychyl, T. A. (2000). Task aversiveness and procrastination: a multi-dimensional approach to task aversiveness across stages of personal projects. *Personality and Individual Differences, 28*(1), 153-167. https://doi.org/10.1016/S0191-8869(99)00091-4

Bonanno, G. A., & Burton, C. L. (2013). Regulatory Flexibility: An Individual Differences Perspective on Coping and Emotion Regulation. *Perspectives on Psychological Science, 8*(6), 591-612. https://doi.org/10.1177/1745691613504116
Brandstatter, V., Job, V., & Schulze, B. (2016). Motivational Incongruence and Well-Being at the Workplace: Person-Job Fit, Job Burnout, and Physical Symptoms. *Front Psychol, 7*, 1-11. https://doi.org/10.3389/fpsyg.2016.01153
Brandt, M. J., Ijzerman, H., Dijksterhuis, A., Farach, F. J., Geller, J., Giner-Sorolla, R., . . . van 't Veer, A. (2014). The Replication Recipe: What makes for a convincing replication? *Journal of Experimental Social Psychology, 50*, 217-224. https://doi.org/10.1016/j.jesp.2013.10.005
Brunstein, J. C. (2018). Implicit and explicit motives. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and action* (3 ed., pp. 369-405). Cham: Springer.
Bürgler, S., Hoyle, R. H., & Hennecke, M. (2021). Flexibility in Using Self-Regulatory Strategies to Manage Self-Control Conflicts: The Role of Metacognitive Knowledge, Strategy Repertoire, and Feedback Monitoring. *European Journal of Personality, 35*(6), 861-880. https://doi.org/10.1177/0890207021992907
Burton, K. D., Lydon, B. E., D´Alessandro, D. U., & Koestner, R. (2006). The Differential Effects of Intrinsic and Identified Motivation on Well-Being and Performance: Prospective, Experimental, and Implicit Approaches to Self-Determination Theory. *Journal of Personality and Social Psychology, 91*(4), 750-762. https://doi.org/10.1037/0022-3514.91.4.750
Canning, E. A., & Harackiewicz, J. M. (2015). Teach It, Don't Preach It: The Differential Effects of Directly-communicated and Self-generated Utility Value Information. *Motivation Science, 1*(1), 47-71. https://doi.org/10.1037/mot0000015
Carnevale, J. J., & Fujita, K. (2016). What Does Ego-Depletion Research Reveal About Self-Control? A Conceptual Analysis. In E. R. Hirt, J. J. Clarkson, & J. Lile (Eds.), *Self-Regulation and Ego Control* (pp. 87-108): Academic Press.
Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: a theoretically based approach. *Journal of Personality and Social Psychology, 56*(2), 267-283. https://doi.org/10.1037/0022-3514.56.2.267
Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: a 40-year meta-analysis. *Psychological Bulletin, 140*(4), 980-1008. https://doi.org/10.1037/a0035661
Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., . . . Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion, 39*(2), 216-236. https://doi.org/10.1007/s11031-014-9450-1
Cheon, S. H., Reeve, J., & Vansteenkiste, M. (2020). When teachers learn how to provide classroom structure in an autonomy-supportive way: Benefits to teachers and their students. *Teaching and Teacher Education, 90*(103004). https://doi.org/10.1016/j.tate.2019.103004
Ciarrochi, J., Hayes, S. C., Oades, L. G., & Hofmann, S. G. (2022). Toward a Unified Framework for Positive Psychology Interventions: Evidence-Based Processes of Change in Coaching, Prevention, and Training. *Frontiers in Psychology, 12*, 809362. https://doi.org/10.3389/fpsyg.2021.809362
Clarkson, J. J., Hirt, E. R., Austin Chapman, D., & Jia, L. (2011). The Impact of Illusory Fatigue on Executive Control. *Social Psychological and Personality Science, 2*(3), 231-238. https://doi.org/10.1177/1948550610386628
Critcher, C. R., & Ferguson, M. J. (2016). "Whether I like it or not, it's important": Implicit importance of means predicts self-regulatory persistence and success. *Journal of Personality and Social Psychology, 110*(6), 818-839. https://doi.org/10.1037/pspa0000053
Csikszentmihalyi, M., & Larson, R. (1987). Validity and reliability of the experience-sampling method. *The Journal of Nervous and Mental Disease, 175*, 526–536.

Cummings, M. L., Gao, F., & Thornburg, K. M. (2016). Boredom in the workplace: A new look at an old problem. *Human Factors, 58*(2), 279-300. https://doi.org/10.1177/0018720815609503
Cunningham, W. A., & Brosch, T. (2012). Motivational Salience: : Amygdala Tuning From Traits, Needs, Values, and Goals. *Current Directions in Psychological Science, 21*(1), 54-59. https://doi.org/10.1177/0963721411430832
Dane, E., & Brummel, B. J. (2013). Examining workplace mindfulness and its relations to job performance and turnover intention. *Human Relations, 67*(1), 105-128. https://doi.org/10.1177/0018726713487753
Davis, W. E., Kelley, N. J., Kim, J., Tang, D., & Hicks, J. A. (2016). Motivating the academic mind: High-level construal of academic goals enhances goal meaningfulness, motivation, and self-concordance. *Motivation and Emotion, 40*(2), 193-202. https://doi.org/10.1007/s11031-015-9522-x
Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating Internalization: The Self-Determination Theory Perspective. *Journal of Personality, 62*(1), 119-142. https://doi.org/10.1111/j.1467-6494.1994.tb00797.x
Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-Determination Theory in Work Organizations: The State of a Science. *Annual Review of Organizational Psychology and Organizational Behavior, 4*(1), 19-43. https://doi.org/10.1146/annurev-orgpsych-032516-113108
Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.
Deci, E. L., & Ryan, R. M. (2000). The “What” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry, 11*, 227-268. https://doi.org/10.1207/S15327965PLI1104_01
Deci, E. L., & Ryan, R. M. (2008). Facilitating Optimal Motivation and Psychological Well-Being Across Life’s Domains. *Canadian Psychology, 49*(1), 14-23. https://doi.org/10.1037/0708-5591.49.1.14
Dewey, J. (1913). *Interest and effort in education*. Houghton: Mifflin.
Donald, J. N., Bradshaw, E. L., Ryan, R. M., Basarkod, G., Ciarrochi, J., Duineveld, J. J., . . . Sahdra, B. K. (2020). Mindfulness and Its Association With Varied Types of Motivation: A Systematic Review and Meta-Analysis Using Self-Determination Theory. *Pers Soc Psychol Bull, 46*(7), 1121-1138. https://doi.org/10.1177/0146167219896136
Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2014). Self-Control in School-Age Children. *Educational Psychologist, 49*(3), 199-217. https://doi.org/10.1080/00461520.2014.926225
Duckworth, A. L., Gendler, T. S., & Gross, J. J. (2016). Situational Strategies for Self-Control. *Perspectives on Psychological Science, 11*(1), 35-55. https://doi.org/10.1177/1745691615623247
Duckworth, A. L., Milkman, K. L., & Laibson, D. (2018). Beyond Willpower: Strategies for Reducing Failures of Self-Control. *Psychological Science in the Public Interest, 19*(3), 102-129. https://doi.org/10.1177/1529100618821893
Eccles, J. S., & Wigfield, A. (2002). Motivational Beliefs, Values and Goals. *Annual Review of Psychology, 53*, 109-132. https://doi.org/10.1146/annurev.psych.53.100901.135153
Eckert, M., Ebert, D. D., Lehr, D., Sieland, B., & Berking, M. (2016). Overcome procrastination: Enhancing emotion regulation skills reduce procrastination. *Learning and Individual Differences,, 52*, 10-18. https://doi.org/10.1016/j.lindif.2016.10.001
Elkins-Brown, N., Teper, R., & Inzlicht, M. (2017). How Mindfulness Enhances Self-Control. In J. C. Karremans & E. K. Papies (Eds.), *Mindfulness in Social Psychology*. New York: Psychology Press.
Engelschalk, T., Steuer, G., & Dresel, M. (2016). Effectiveness of motivational regulation: Dependence on specific motivational problems. *Learning and Individual Differences, 52*, 72-78. https://doi.org/10.1016/j.lindif.2016.10.011
EY. (2019). *EY Jobstudie 2019: Motivation, Zufriedenheit und Work Life Balance - Ergebnisse einer Befragung von 1.510 Arbeitnehmer(inne)n in Deutschland*.

Retrieved from https://assets.ey.com/content/dam/ey-sites/ey-com/de_de/news/2019/12/ey-jobstudie-zufriedenheit-work-life-balance-2019.pdf
Field, A. P. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5 ed.). London: SAGE.
Fishbach, A., & Hofmann, W. (2015). Nudging self-control: A smartphone intervention of temptation anticipation and goal resolution improves everyday goal progress. *Motivation Science, 1*(3), 137-150. https://doi.org/10.1037/mot0000022
Folkman, S. (1997). Positive Psychological States and Coping with Severe Stress *Social Science & Medicine, 45*(8), 1207-1221. https://doi.org/10.1016/S0277-9536(97)00040-3
Folkman, S., & Moskowitz, J. T. (2000). Positive affect and the other side of coping. *American Psychologist, 55*(6), 647-654. https://doi.org/10.1037/0003-066x.55.6.647
Ford, B. Q., Gross, J. J., & Gruber, J. (2019). Broadening Our Field of View: The Role of Emotion Polyregulation. *Emotion Review, 11*(3), 197-208. https://doi.org/10.1177/1754073919850314
Ford, B. Q., Karnilowicz, H. R., & Mauss, I. B. (2017). Understanding reappraisal as a multicomponent process: The psychological health benefits of attempting to use reappraisal depend on reappraisal success. *Emotion, 17*(6), 905-911. https://doi.org/10.1037/emo0000310
Ford, B. Q., & Troy, A. S. (2019). Reappraisal Reconsidered: A Closer Look at the Costs of an Acclaimed Emotion-Regulation Strategy. *Current Directions in Psychological Science, 28*(2), 195-203. https://doi.org/10.1177/0963721419827526
Francis, Z., & Inzlicht, M. (2016). Proximate and Ultimate Causes of Ego Depletion. In E. R. Hirt, J. J. Clarkson, & L. Jia (Eds.), *Self-Regulation and Ego Control* (pp. 373-398). New York: Elsevier.
Freund, A. M., & Hennecke, M. (2015). On Means and Ends: The Role of Goal Focus in Successful Goal Pursuit. *Current Directions in Psychological Science, 24*(2), 149-153. https://doi.org/10.1177/0963721414559774
Friese, M., Loschelder, D. D., Gieseler, K., Frankenbach, J., & Inzlicht, M. (2018). Is Ego Depletion Real? An Analysis of Arguments. *Personality and Social Psychology Review*, 1088868318762183. https://doi.org/10.1177/1088868318762183
Fröhlich, S. M., & Kuhl, J. (2003). Das selbststeuerungsinventar: Dekomponierung volitionaler funktionen. In J. Stiensmeier-Pelster & F. Rheinberg (Eds.), *Diagnostik von Motivation und Selbstkonzept* (pp. 221-257). Weimar: Hogrefe.
Gagné, M., & Deci, E. L. (2005). Self-Determination Theory and Work Motivation. *Journal of Organizational Behavior, 26*(331-362). https://doi.org/10.1002/job.322
Gallup. (2017). *State of the Global Workplace Report* Retrieved from New York
Gallup. (2023). *Engagement Index 2022 - Deutschland*. Retrieved from https://www.gallup.com/de/472028/bericht-zum-engagement-index-deutschland.aspx
Gao, H., Zhang, Y., Wang, F., Xu, Y., Hong, Y. Y., & Jiang, J. (2014). Regret causes ego-depletion and finding benefits in the regrettable events alleviates ego-depletion. *Journal of General Psychology, 141*(3), 169-206. https://doi.org/10.1080/00221309.2014.884053
Garland, E. L., Farb, N. A., Goldin, P. R., & Fredrickson, B. L. (2015). The Mindfulness-to-Meaning Theory: Extensions, Applications, and Challenges at the Attention–Appraisal–Emotion Interface. *Psychological Inquiry, 26*(4), 377-387. https://doi.org/10.1080/1047840x.2015.1092493
Garland, E. L., Gaylord, S. A., & Fredrickson, B. L. (2011). Positive Reappraisal Mediates the Stress-Reductive Effects of Mindfulness: An Upward Spiral Process. *Mindfulness, 2*(1), 59-67. https://doi.org/10.1007/s12671-011-0043-8
Garland, E. L., Gaylord, S. A., & Park, J. (2009). The role of mindfulness in positive reappraisal. *Explore (NY), 5*(1), 37-44. https://doi.org/10.1016/j.explore.2008.10.001
Garland, E. L., Kiken, L. G., Faurot, K., Palsson, O., & Gaylord, S. A. (2017). Upward Spirals of Mindfulness and Reappraisal: Testing the Mindfulness-to-Meaning Theory with Autoregressive Latent Trajectory Modeling. *Cognitive Therapy and Research, 41*(3), 381-392. https://doi.org/10.1007/s10608-016-9768-y

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences, 30*, 1311-1327. https://doi.org/10.1016/S0191-8869(00)00113-6
Gendolla, G. H. E., & Richter, M. (2010). Effort mobilization when the self is involved: Some lessons from the cardiovascular system. *Review of General Psychology, 14*(3), 212-226. https://doi.org/10.1037/a0019742
Giambra, L. M., & Quilter, R. E. (1989). Sex differences in sustained attention across the adult life span. *Journal of Applied Psychology, 74*(1), 91-95. https://doi.org/10.1037/0021-9010.74.1.91
Gieseler, K., Loschelder, D. D., Job, V., & Friese, M. (2021). A preregistered test of competing theories to explain ego depletion effects using psychophysiological indicators of mental effort. *Motivation Science, 7*(1), 32-45. https://doi.org/10.1037/mot0000183
Gillebaart, M. (2018). The 'Operational' Definition of Self-Control. *Frontiers in Psychology, 9*, 1231. https://doi.org/10.3389/fpsyg.2018.01231
Gillebaart, M., & de Ridder, D. T. D. (2015). Effortless Self-Control: A Novel Perspective on Response Conflict Strategies in Trait Self-Control. *Social and Personality Psychology Compass, 9*(2), 88-99. https://doi.org/10.1111/spc3.12160
Gillet, N., Morin, A. J. S., & Reeve, J. (2017). Stability, change, and implications of students' motivation profiles: A latent transition analysis. *Contemporary Educational Psychology, 51*, 222-239. https://doi.org/10.1016/j.cedpsych.2017.08.006
Gnambs, T., & Hanfstingl, B. (2016). The decline of academic motivation during adolescence: An accelerated longitudinal cohort analysis on the effect of psychological need satisfaction. *Educational Psychology, 36*(9), 1691-1705. https://doi.org/10.1080/01443410.2015.1113236
Gore, J. S., & Cross, S. E. (2006). Pursuing goals for us: Relationally autonomous reasons in long-term goal pursuit. *Journal of Personality and Social Psychology, 90*(5), 848-861. https://doi.org/10.1037/0022-3514.90.5.848
Green-Demers, I., Pelletier, L. G., Stewart, D. G., & Gushue, N. R. (1998). Coping With the Less Interesting Aspects of Training: Toward a Model of Interest an Motivation Enhancement in Individual Sports. *Basic and Applied Social Psychology, 20*(4), 251-261. https://doi.org/10.1207/s15324834basp2004_2
Gröpel, P., & Kehr, H. M. (2013). Motivation and self-control: implicit motives moderate the exertion of self-control in motive-related tasks. *Journal of Personality, 82*(4), 317-328. https://doi.org/10.1111/jopy.12059
Gröpel, P., & Steel, P. (2008). A mega-trial investigation of goal setting, interest enhancement, and energy on procrastination. *Personality and Individual Differences, 45*(5), 406-411. https://doi.org/10.1016/j.paid.2008.05.015
Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*(3), 271-299. https://doi.org/10.1037/1089-2680.2.3.271
Gross, J. J. (2015). Emotion Regulation: Current Status and Future Prospects. *Psychological Inquiry, 26*(1), 1-26. https://doi.org/10.1080/1047840x.2014.940781
Grund, A., Fries, S., & Rheinberg, F. (2018). Know Your Preferences: Self-Regulation as Need-Congruent Goal Selection. *Review of General Psychology, 22*(4), 437-451. https://doi.org/10.1037/gpr0000159
Grund, A., Grunschel, C., Bruhn, D., & Fries, S. (2015). Torn between want and should: An experience-sampling study on motivational conflict, well-being, self-control, and mindfulness. *Motivation and Emotion, 39*(4), 506-520. https://doi.org/10.1007/s11031-015-9476-z
Grunschel, C., Schwinger, M., Steinmayr, R., & Fries, S. (2016). Effects of using motivational regulation strategies on students' academic procrastination, academic performance, and well-being. *Learning and Individual Differences, 49*, 162-170. https://doi.org/10.1016/j.lindif.2016.06.008
Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the Assessment of Situational Intrinsic and Extrinsic Motivation: The Situational Motivation Scale (SIMS). *Motivation and Emotion, 24*(3), 175-213. https://doi.org/10.1023/A:1005614228250

Hagger, M. S., Chatzisarantis, N. L. D., Alberts, H., Anggono, C. O., Batailler, C., Birt, A. R., . . . Zwienenberg, M. (2016). A Multilab Preregistered Replication of the Ego-Depletion Effect. *Perspectives on Psychological Science, 11*(4), 546-573. https://doi.org/10.1177/0956797614526415

Haines, S. J., Gleeson, J., Kuppens, P., Hollenstein, T., Ciarrochi, J., Labuschagne, I., . . . Koval, P. (2016). The wisdom to know the difference: Emotion regulation strategy-situation fit in daily life is associated with well-being. *Psychol Sci, 27*(12), 1651-1659. https://doi.org/10.1177/0956797616669086

Hanley, A. W., Palejwala, M. H., Hanley, R. T., Canto, A. I., & Garland, E. L. (2015). A failure in mind: Dispositional mindfulness and positive reappraisal as predictors of academic self-efficacy following failure. *Personality and Individual Differences, 86*, 332-337. https://doi.org/10.1016/j.paid.2015.06.033

Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Priniski, S. J., & Hyde, J. S. (2016). Closing achievement gaps with a utility-value intervention: Disentangling race and social class. *Journal of Personality and Social Psychology, 111*(5), 745-765. https://doi.org/10.1037/pspp0000075

Harackiewicz, J. M., & Priniski, S. J. (2018). Improving Student Outcomes in Higher Education: The Science of Targeted Intervention. *Annual Review of Psychology, 69*, 409-435. https://doi.org/10.1146/annurev-psych-122216011725

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*: Guilford publications.

Heckhausen, J., & Heckhausen, H. (2018). Motivation and action: Introduction and overview *Motivation and action* (3 ed., pp. 1-14). Cham: Springer.

Hennecke, M., & Bürgler, S. (2020). Many roads lead to Rome: Self-regulatory strategies and their effects on self-control. *Social and Personality Psychology Compass*. https://doi.org/10.1111/spc3.12530

Hennecke, M., Czikmantori, T., & Brandstätter, V. (2019). Doing Despite Disliking: Self-regulatory Strategies in Everyday Aversive Activities. *European Journal of Personality, 33*, 104-128. https://doi.org/10.1002/per

Heth, J. T., & Somer, E. (2002). Characterizing stress tolerance:“Controllability awareness” and its relationship to perceived stress and reported health. *Personality and Individual Differences, 33*(6), 883-895. https://doi.org/10.1016/S0191-8869(01)00198-2

Heublein, U., Ebert, J., Hutzsch, C., Isleib, S., König, R., Richter, J., & Woisch, A. (2017) Zwischen Studienerwartungen und Studienwirklichkeit. Ursachen des Studienabbruchs, beruflicher Verbleib der Studienabbrecherinnen und Studienabbrecher und Entwicklung der Studienabbruchquote an deutschen Hochschulen. *Vol. 1. Forum Hochschule*. Hannover: DZHW.

Hofer, J., & Busch, H. (2011). Satisfying one’s needs for competence and relatedness: Consequent domain-specific well-being depends on strength of implicit motives. *Personality and Social Psychology Bulletin, 37*, 1147–1158. https://doi.org/10.1177/0146167211408329

Hofmann, W., Finkel, E. J., & Fitzsimons, G. M. (2015). Close relationships and self-regulation: How relationship satisfaction facilitates momentary goal pursuit. *Journal of Personality and Social Psychology, 109*, 434–452. https://doi.org/10.1037/pspi0000020

Hope, N. H., Milyavskaya, M., Holding, A. C., & Koestner, R. (2016). The humble path to progress: Goal-specific aspirational content predicts goal progress and goal vitality. *Personality and Individual Differences, 90*, 99-107. https://doi.org/10.1016/j.paid.2015.10.038

Hopstaken, J. F., van der Linden, D., Bakker, A. B., & Kompier, M. A. (2015). A multifaceted investigation of the link between mental fatigue and task disengagement. *Psychophysiology, 52*(3), 305-315. https://doi.org/10.1111/psyp.12339

Howard, J., Gagné, M., Morin, A. J. S., & Van den Broeck, A. (2016). Motivation profiles at work: A self-determination theory approach. *Journal of Vocational Behavior, 95-96*, 74-89. https://doi.org/10.1016/j.jvb.2016.07.004

Howard, J. L., Gagné, M., & Bureau, J. S. (2017). Testing a continuum structure of self-determined motivation: A meta-analysis. *Psychological Bulletin, 143*(2), 1346-1377. https://doi.org/10.1037/bul0000125
Hox, J. J., Moerbeek, M., & van de Schoot, R. (2010). *Multilevel analysis: Techniques and applications*: Routledge.
Hoyle, R. H., & Davisson, E. K. (2016). Varieties of self-control and their personality correlates. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 396–413). New York, NY: The Guilford Press.
Hulleman, C. S., Godes, O., Hendricks, B. L., & Harackiewicz, J. M. (2010). Enhancing interest and performance with a utility value intervention. *Journal of Educational Psychology, 102*(4), 880-895. https://doi.org/10.1037/a0019506
Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and performance in high school science classes. *Science, 326*(5958), 1410-1412. https://doi.org/10.1126/science.1177067
Hulleman, C. S., Kosovich, J. J., Barron, K. E., & Daniel, B. D. (2017). Making Connections: Replicating and Extending the Utility Value Intervention in the Classroom. *Journal of Educational Psychology, 109* (3), 387-404. https://doi.org/10.1037/edu0000146
Inzlicht, M., & Berkman, E. (2015). Six Questions for the Resource Model of Control (and Some Answers). *Social and Personality Psychology Compass, 9*(10), 511–524. https://doi.org/10.1111/spc3.12200
Inzlicht, M., Berkman, E., & Elkins-Brown, N. (2016). The Neuroscience of "Ego Depletion". How the Brain can Help us Understand why Self-control Seems Limited. In E. Harmon-Jones & M. Inzlicht (Eds.), *Social Neuroscience: Biological Approaches to Social Psychology* (pp. 101-123). New York: Routledge.
Inzlicht, M., & Friese, M. (2019). The Past, Present, and Future of Ego Depletion. *Social Psychology, 50*(5-6), 370-378. https://doi.org/10.1027/1864-9335/a000398
Inzlicht, M., & Gutsell, J. (2007). Running on Empty. Neural Signals for Self-Control Failure. *Psychological Science, 18*(11), 933-937. https://doi.org/10.1111/j.1467-9280.2007.02004.x
Inzlicht, M., Legault, L., & Teper, R. (2014). Exploring the Mechanisms of Self-Control Improvement. *Current Directions in Psychological Science, 23*(4), 302-307. https://doi.org/10.1177/0963721414534256
Inzlicht, M., Schmeichel, B. J., & Macrae, C. N. (2014). Why self-control seems (but may not be) limited. *Trends in Cognitive Sciences, 18*(3), 127-133. https://doi.org/10.1016/j.tics.2013.12.009
Jamieson, J. P., Crum, A. J., Goyer, J. P., Marotta, M. E., & Akinola, M. (2018). Optimizing stress responses with reappraisal and mindset interventions: an integrated model. *Anxiety Stress Coping, 31*(3), 245-261. https://doi.org/10.1080/10615806.2018.1442615
Jang, H. (2008). Supporting students' motivation, engagement, and learning during an uninteresting activity. *Journal of Educational Psychology, 100*(4), 798-811. https://doi.org/10.1037/a0012841
Job, V., & Brandstätter, V. (2009). Get a taste of your goals: promoting motive-goal congruence through affect-focus goal fantasy. *Journal of Personality, 77*(5), 1527-1559. https://doi.org/10.1111/j.1467-6494.2009.00591.x
Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego depletion - is it all in your head?: Implicit theories about willpower affect self-regulation. *Psychological Science, 21*(11), 1686-1693. https://doi.org/10.1177/0956797610384745
Job, V., Walton, G. M., Bernecker, K., & Dweck, C. S. (2013). Beliefs about willpower determine the impact of glucose on self-control. *PNAS, 110*(37), 14837-14842. https://doi.org/10.1073/pnas.1313475110
Jostmann, N. B., & Koole, S. L. (2007). On the regulation of cognitive control: action orientation moderates the impact of high demands in Stroop interference tasks. *Journal of Experimental Psychology: General, 136*(4), 593-609. https://doi.org/10.1037/0096-3445.136.4.593

Kazén, M., & Kuhl, J. (2005). Intention memory and achievement motivation: volitional facilitation and inhibition as a function of affective contents of need-related stimuli. *Journal of Personality and Social Psychology, 89*(3), 426-448. https://doi.org/10.1037/0022-3514.89.3.426
Kazén, M., & Kuhl, J. (2011). Directional discrepancy between implicit and explicit power motives is related to well-being among managers. *Motivation and Emotion, 35*(3), 317-327. https://doi.org/10.1007/s11031-011-9219-8
Kazén, M., Kuhl, J., & Leicht, E. M. (2015). When the going gets tough…: Self-motivation is associated with invigoration and fun. *Psychological Research, 79*(6), 1064-1076. https://doi.org/10.1007/s00426-014-0631-z
Kehr, H. M. (2004). Integrating Implicit Motives, Explicit Motives, and Perceived Abilities: The Compensatory Model of Work Motivation and Volition. *Academy of Management Review, 29*(3), 379-399. https://doi.org/10.5465/amr.2004.13670963
Kehr, H. M. (2004b). Implicit/explicit motive discrepancies and volitional depletion among managers. *Personality and Social Psychology Bulletin, 30*(3), 315-327. https://doi.org/10.1177/0146167203256967
Kehr, H. M., Strasser, M., & Paulus, A. (2018). Motivation and volition in the workplace. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and action* (3 ed., pp. 819-852). Cham: Springer.
Kehr, H. M., & v. Rosenstiel, L. (2006). Self-Management-Training (SMT). Theoretical and Empirical Foundations for the Development for a Metamotivational and Metavolitional Intervention Program. In D. Frey, H. Mandl, & L. v. Rosenstiel (Eds.), *Knowledge and Action*. Göttingen: Hogrefe & Huber Publishers.
Ketonen, E. E., Dietrich, J., Moeller, J., Salmela-Aro, K., & Lonka, K. (2018). The role of daily autonomous and controlled educational goals in students' academic emotion states: An experience sampling method approach. *Learning and Instruction, 53*, 10-20. https://doi.org/10.1016/j.learninstruc.2017.07.003
Klein, H. J., Noe, R. A., & Wang, C. (2006). Motivation to learn and course outcomes: The impact of delivery mode, learning goal orientation, and perceived barriers and enablers. *Personnel psychology, 59*(3), 665-702. https://doi.org/10.1111/j.1744-6570.2006.00050.x
Kobylinska, D., & Kusev, P. (2019). Flexible Emotion Regulation: How Situational Demands and Individual Differences Influence the Effectiveness of Regulatory Strategies. *Frontiers in Psychology, 10*, 72. https://doi.org/10.3389/fpsyg.2019.00072
Koestner, R., Otis, N., Powers, T. A., Pelletier, L., & Gagnon, H. (2008). Autonomous motivation, controlled motivation, and goal progress. *Journal of Personality, 76*, 1201-1229. https://doi.org/10.1111/j.1467-6494.2008.00519.x
Koestner, R., Powers, T. A., Milyavskaya, M., Carbonneau, N., & Hope, N. (2015). Goal internalization and persistence as a function of autonomous and directive forms of goal support. *Journal of Personality, 83*(2), 179-190. https://doi.org/10.1111/jopy.12093
Kotabe, H. P., & Hofmann, W. (2015). On Integrating the Components of Self-Control. *Perspectives on Psychological Science, 10*(5), 618-638. https://doi.org/10.1177/1745691615593382
Krause, K., & Freund, A. M. (2016). It's in the means: Process focus helps against procrastination in the academic context. *Motivation and Emotion, 40*(3), 422-437. https://doi.org/10.1007/s11031-016-9541-2
Kreft, I., & de Leeuw, J. (1998). *Introducing multilevel modeling*. Thousand Oaks: Sage.
Kruglanski, A. W., Shah, J. Y., Fishbach, A., Friedman, R., Chun, W. Y., & Sleeth-Keppler, D. (2002). A Theory of Goal Systems. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (pp. 331-378). San Diego: Academic Press.
Kryshko, O., Fleischer, J., Waldeyer, J., Wirth, J., & Leutner, D. (2020). Do motivational regulation strategies contribute to university students' academic success? *Learning and Individual Differences, 82*, 101912. https://doi.org/10.1016/j.lindif.2020.101912
Kuhl, J., & Fuhrmann, A. (1998). Decomposing Self-Regulation and Self-Control: The Volitional Components Inventory. In J. Heckhausen & C. S. Dweck (Eds.), *Motivation*

and Self-Regulation Across the Life Span (pp. 15-49). Cambridge University Press: Cambridge.
Kuvaas, B., Buch, R., Weibel, A., Dysvik, A., & Nerstad, C. G. L. (2017). Do intrinsic and extrinsic motivation relate differently to employee outcomes? *Journal of Economic Psychology, 61*, 244-258. https://doi.org/10.1016/j.joep.2017.05.004
Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Frontiers in Psychology, 4*(863), 1-12. https://doi.org/10.3389/fpsyg.2013.00863
Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology, 56*, 485-516. https://doi.org/10.1146/annurev.psych.55.090902.142105
Lee, N., Chatzisarantis, N., & Hagger, M. S. (2016). Adequacy of the Sequential-Task Paradigm in Evoking Ego-Depletion and How to Improve Detection of Ego-Depleting Phenomena. *Frontiers in Psychology, 7*, 136. https://doi.org/10.3389/fpsyg.2016.00136
Legault, L., Green-Demers, I., & Pelletier, L. (2006). Why do high school students lack motivation in the classroom? Toward an understanding of academic amotivation and the role of social support. *Journal of Educational Psychology, 98*(3), 567-582. https://doi.org/10.1037/0022-0663.98.3.567
Legault, L., & Inzlicht, M. (2013). Self-determination, self-regulation, and the brain: autonomy improves performance by enhancing neuroaffective responsiveness to self-regulation failure. *Journal of Personality and Social Psychology, 105*(1), 123-138. https://doi.org/10.1037/a0030426
Lepper, M. R., Henderlong Corpus, J., & Iyengar, S. S. (2005). Intrinsic and Extrinsic Motivational Orientations in the Classroom: Age Differences and Academic Correlates. *Journal of Educational Psychology, 97*(2), 184-196. https://doi.org/10.1037/0022-0663.97.2.184
Leroy, V., Grégoire, J., Magen, E., Gross, J. J., & Mikolajczak, M. (2012). Resisting the sirens of temptation while studying: Using reappraisal to increase focus, enthusiasm, and performance. *Learning and Individual Differences, 22*(2), 263-268. https://doi.org/10.1016/j.lindif.2011.10.003
Lewin, K. (1926). Vorsatz, Wille und Bedürfnis. *Psychologische Forschung, 7*(1), 330-385.
Lichstein, K. L., Riedel, B. W., & Richman, S. L. (2000). The Mackworth Clock Test: A Computerized Version. *Journal of Psychology, 134*, 153-161. https://doi.org/10.1080/00223980009600858
Locke, E. A., & Schattke, K. (2018). Intrinsic and extrinsic motivation: Time for expansion and clarification. *Motivation Science*. https://doi.org/10.1037/mot0000116
Lysova, E. I., Allan, B. A., Dik, B. J., Duffy, R. D., & Steger, M. F. (2019). Fostering meaningful work in organizations: A multi-level review and integration. *Journal of Vocational Behavior, 110*, 374-389. https://doi.org/10.1016/j.jvb.2018.07.004
Magen, E., & Gross, J. J. (2010). Getting our act together: Toward a general model of self-control. In R. Hassin, K. Ochsner, & Y. Trope (Eds.), *Self control in society, mind and brain* (pp. 335–353). Oxford, England: Oxford University Press.
Manganelli, L., Thibault-Landry, A., Forest, J., & Carpentier, J. (2018). Self-Determination Theory Can Help You Generate Performance and Well-Being in the Workplace: A Review of the Literature. *Advances in Developing Human Resources, 20*(2), 227-240. https://doi.org/10.1177/1523422318757210
Markland, D., & Hardy, L. (1997). On the factorial and construct validity of the Intrinsic Motivation Inventory: conceptual and operational concerns. *Research Quartlerly for Exercise and Sport, 68*(1), 20-32. https://doi.org/10.1080/02701367.1997.10608863
Martela, F., DeHaan, C. R., & Ryan, R. M. (2016). On enhancing and diminishing energy through psychological means: Research on vitality and depletion from self-determination theory. In E. R. Hirt, J. J. Clarkson, & L. Jia (Eds.), *Self-regulation and ego control* (pp. 67-85). New York, NY: Elsevier.

McCambridge, J., Witton, J., & Elbourne, D. R. (2014). Systematic review of the Hawthorne effect: new concepts are needed to study research participation effects. *Journal of Clinical Epidemiology, 67*(3), 267-277. https://doi.org/10.1016/j.jclinepi.2013.08.015
McClelland, D. C. (1985). How motives, skills, and values determine what people do. *American Psychologist, 40*(7), 812-825. https://doi.org/10.1037/0003-066X.40.7.812
McClelland, D. C., Koestner, R., & Weinberger, J. (1989). How do self-attributed and implicit motives differ? *Psychological Review, 96*(4), 690-702. https://doi.org/10.1037/0033-295X.96.4.690
McClelland, D. C., & Pilon, D. A. (1983). Sources of adult motives in patterns of parent behavior in early childhood. *Journal of Personality and Social Psychology, 44*(3), 564-574. https://doi.org/10.1037/0022-3514.44.3.564
McRae, K. (2016). Cognitive emotion regulation: a review of theory and scientific findings. *Current Opinion in Behavioral Sciences, 10*, 119-124. https://doi.org/10.1016/j.cobeha.2016.06.004
McRae, K., Ciesielski, B., & Gross, J. J. (2012). Unpacking cognitive reappraisal: goals, tactics, and outcomes. *Emotion, 12*(2), 250-255. https://doi.org/10.1037/a0026351
Menges, J. I., Tussing, D. V., Wihler, A., & Grant, A. M. (2017). When Job Performance is All Relative: How Family Motivation Energizes Effort and Compensates for Intrinsic Motivation. *Academy of Management Journal, 60*(2), 695-719. https://doi.org/10.5465/amj.2014.0898
Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: dynamics of willpower. *Psychological Review, 106*(1), 3-19. https://doi.org/10.1037/0033-295X.106.1.3
Metin, U. B., Taris, T. W., & Peeters, M. C. W. (2016). Measuring procrastination at work and its associated workplace aspects. *Personality and Individual Differences, 101*, 254-263. https://doi.org/10.1016/j.paid.2016.06.006
Miele, D. B., & Scholer, A. A. (2018). The Role of Metamotivational Monitoring in Motivation Regulation. *Educational Psychologist, 53*(1), 1-21. https://doi.org/10.1080/00461520.2017.1371601
Milyavskaya, M., Berkman, E. T., & De Ridder, D. T. (2019). The many faces of self control: Tacit assumptions and recommendations to deal with them. *Motivation Science, 5*(1), 79-85. https://doi.org/10.1037/mot0000108
Milyavskaya, M., Galla, B., Inzlicht, M., & Duckworth, A. (2021). More Effort, Less Fatigue: The Role of Interest in Increasing Effort and Reducing Mental Fatigue. *Frontiers in Psychology*. https://doi.org/10.3389/fpsyg.2021.755858
Milyavskaya, M., & Inzlicht, M. (2017). What's So Great About Self-Control? Examining the Importance of Effortful Self-Control and Temptation in Predicting Real-Life Depletion and Goal Attainment. *Social Psychological and Personality Science, 8*(6), 603-611. https://doi.org/10.1177/1948550616679237
Milyavskaya, M., Inzlicht, M., Hope, N., & Koestner, R. (2015). Saying "no" to temptation: Want-to motivation improves self-regulation by reducing temptation rather than by increasing self-control. *Journal of Personality and Social Psychology, 109*(4), 677-693. https://doi.org/10.1037/pspp0000045
Milyavskaya, M., Nadolny, D., & Koestner, R. (2014). Where Do Self-Concordant Goals Come From? The Role of Domain-Specific Psychological Need Satisfaction. *Personality and Social Psychology Bulletin, 40*(6), 700-711. https://doi.org/10.1177/0146167214524445
Mischel, W., Ayduk, O., Berman, M. G., Casey, B. J., Gotlib, I. H., Jonides, J., . . . Shoda, Y. (2011). 'Willpower' over the life span: decomposing self-regulation. *Social Cognitive and Affective Neuroscience, 6*(2), 252-256. https://doi.org/10.1093/scan/nsq081
Molden, D. C., Hui, C. M., & Scholer, A. A. (2016). Understanding self-regulation failure: A motivated effort-allocation account. In E. R. Hirt, J. J. Clarkson, & L. Jia (Eds.), *Self-Regulation and Ego Control* (pp. 425-459). New York: Elsevier.
Moller, A. C., Deci, E. L., & Ryan, R. M. (2006). Choice and Ego-Depletion: The Moderating Role of Autonomy. *Personality and Social Psychology Bulletin, 32*(8), 1024-1036. https://doi.org/10.1177/0146167206288008

Moors, A., Ellsworth, P. C., Scherer, K. R., & Frijda, N. H. (2013). Appraisal Theories of Emotion: State of the Art and Future Development. *Emotion Review, 5*(2), 119-124. https://doi.org/10.1177/1754073912468165
Muller, F., & Rothermund, K. (2017). Motive-goal congruence moderates the use of automatic self-regulation. *Journal of Personality, 86*(4), 752-766. https://doi.org/10.1111/jopy.12355
Müller, T., & Apps, M. A. J. (2018). Motivational fatigue: A neurocognitive framework for the impact of effortful exertion on subsequent motivation. *Neuropsychologia*. https://doi.org/10.1016/j.neuropsychologia.2018.04.030
Muraven, M. (2008). Autonomous Self-Control is Less Depleting. *Journal of Research in Personality, 42*(3), 763-770. https://doi.org/10.1016/j.jrp.2007.08.002
Muraven, M., Gagné, M., & Rosman, H. (2008). Helpful Self-Control: Autonomy Support, Vitality, and Depletion. *Journal of Experimental Social Psychology, 44*(3), 573-585. https://doi.org/10.1016/j.jesp.2007.10.008
Muraven, M., Rosman, H., & Gagné, M. (2007). Lack of autonomy and self-control: Performance contingent rewards lead to greater depletion. *Motivation and Emotion, 31*(4), 322-330. https://doi.org/10.1007/s11031-007-9073-x
Muraven, M., & Slessareva, E. (2003). Mechanisms of Self-Control Failure: Motivation and Limited Resources. *Personality and Social Psychology Bulletin, 29*(7), 894-906. https://doi.org/10.1177/0146167203253209
Murayama, K., Pekrun, R., Lichtenfeld, S., & Vom Hofe, R. (2013). Predicting long-term growth in students' mathematics achievement: the unique contributions of motivation and cognitive strategies. *Child Dev, 84*(4), 1475-1490. https://doi.org/10.1111/cdev.12036
Myrseth, K. O. R., & Fishbach, A. (2009). Self-control: A Function of Knowing When and How to Exercise Restraint. *Current Directions in Psychological Science, 18*(4), 247-252. https://doi.org/10.1111/j.1467-8721.2009.01645.x
Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored?: Students' strategies for coping with boredom. *Learning and Individual Differences, 20*(6), 626-638. https://doi.org/10.1016/j.lindif.2010.09.004
Neyrinck, B., Vansteenkiste, M., Lens, W., Duriez, B., & Hutsebaut, D. (2006). Cognitive, Affective and Behavioral Correlates of Internalization of Regulations for Religious Activities. *Motivation and Emotion, 30*(4), 321-332. https://doi.org/10.1007/s11031-006-9048-3
Nix, G. A., Ryan, R. M., Manly, J. B., & Deci, E. L. (1999). Revitalization through Self-Regulation: The Effects of Autonomous and Controlled Motivation on Happiness and Vitality. *Journal of Experimental Social Psychology, 35*, 266-284. https://doi.org/10.1006/jesp.1999.1382
Nowlan, J. S., Wuthrich, V. M., & Rapee, R. M. (2015). Positive reappraisal in older adults: a systematic literature review. *Aging & Mental Health, 19*(6), 475-484. https://doi.org/10.1080/13607863.2014.954528
Ntoumanis, N., Healy, L. C., Sedikides, C., Duda, J., Stewart, B., Smith, A., & Bond, J. (2014). When the going gets tough: the "why" of goal striving matters. *Journal of Personality, 82*(3), 225-236. https://doi.org/10.1111/jopy.12047
Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences, 9*(5), 242-249. https://doi.org/10.1016/j.tics.2005.03.010
Oettingen, G., & Mayer, D. (2002). The motivating function of thinking about the future: Expectations versus fantasies. *Journal of Personality and Social Psychology, 83*(5), 1198-1212. https://doi.org/10.1037/0022-3514.83.5.1198
Oettingen, G., & Reininger, K. M. (2016). The power of prospection: mental contrasting and behavior change. *Social and Personality Psychology Compass, 10*(11), 591-604. https://doi.org/10.1111/spc3.12271
Pagnini, F., & Langer, E. J. (2015). Mindful Reappraisal: Comment on “Mindfulness Broadens Awareness and Builds Eudaimonic Meaning: A Process Model of Mindful Positive Emotion Regulation”. *Psychological Inquiry, 26*(4), 365-367. https://doi.org/10.1080/1047840x.2015.1073660

Parsons, H. M. (1974). What Happened at Hawthorne? New evidence suggests the Hawthorne effect resulted from operant reinforcement contingencies. *Science, 183*(4128), 922-932.
Pavani, J.-B., Le Vigouroux, S., Kop, J.-L., Congard, A., & Dauvier, B. (2015). Affect and Affect Regulation Strategies Reciprocally Influence Each Other in Daily Life: The Case of Positive Reappraisal, Problem-Focused Coping, Appreciation and Rumination. *Journal of Happiness Studies*. https://doi.org/10.1007/s10902-015-9686-9
Pekrun, R., Goetz, T., Daniels, L. M., Stupnisky, R. H., & Perry, R. P. (2010). Boredom in achievement settings: Exploring control–value antecedents and performance outcomes of a neglected emotion. *Journal of Educational Psychology, 102*(3), 531-549. https://doi.org/10.1037/a0019243
Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of School Psychology, 48*(1), 85-112. https://doi.org/10.1016/j.jsp.2009.09.002
Pinder, C. C. (2008). *Work Motivation in Organizational Behavior*. New York: Psychology Press.
Pogrebtsova, E., Craig, J., Chris, A., O'Shea, D., & Gonzalez-Morales, M. G. (2018). Exploring daily affective changes in university students with a mindful positive reappraisal intervention: A daily diary randomized controlled trial. *Stress Health, 34*(1), 46-58. https://doi.org/10.1002/smi.2759
Priniski, S. J., Hecht, C. A., & Harackiewicz, J. M. (2018). Making Learning Personally Meaningful: A New Framework for Relevance Research. *The Journal of Experimental Education, 86*(1), 11-29. https://doi.org/10.1080/00220973.2017.1380589
Putwain, D. W., Nicholson, L. J., Pekrun, R., Becker, S., & Symes, W. (2019). Expectancy of success, attainment value, engagement, and achievement: A moderated mediation analysis. *Learning and Instruction, 60*, 117-125. https://doi.org/10.1016/j.learninstruc.2018.11.005
Quoidbach, J., Mikolajczak, M., & Gross, J. J. (2015). Positive interventions: An emotion regulation perspective. *Psychological Bulletin, 141*(3), 655-693. https://doi.org/10.1037/a0038648
Ranney, R. M., Bruehlman-Senecal, E., & Ayduk, O. (2016). Comparing the Effects of Three Online Cognitive Reappraisal Trainings on Well-Being. *Journal of Happiness Studies*. https://doi.org/10.1007/s10902-016-9779-0
Rawolle, M., Schultheiss, O. C., Strasser, A., & Kehr, H. M. (2017). The Motivating Power of Visionary Images: Effects on Motivation, Affect, and Behavior. *Journal of Personality, 85*(6), 769-781. https://doi.org/10.1111/jopy.12285
Rawolle, M., Wallis, M. S. v., Badham, R., & Kehr, H. M. (2016). No fit, no fun: The effect of motive incongruence on job burnout and the mediating role of intrinsic motivation. *Personality and Individual Differences, 89*, 65-68. https://doi.org/10.1016/j.paid.2015.09.030
Reeve, J. (2009). Why Teachers Adopt a Controlling Motivating Style Toward Students and How They Can Become More Autonomy Supportive. *Educational Psychologist, 44*(3), 159-175. https://doi.org/10.1080/00461520903028990
Reeve, J. (2012). A Self-determination Theory Perspective on Student Engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149-172). Boston, MA: Springer.
Reeve, J., & Jang, H. (2006). What teachers say and do to support students' autonomy during a learning activity. *Journal of Educational Psychology, 98*(1), 209-218. https://doi.org/10.1037/0022-0663.98.1.209
Reeve, J., Jang, H., Hardre, P., & Omura, M. (2002). Providing a Rationale in an Autonomy-Supportive Way as a Strategy to Motivate Others During an Uninteresting Activity. *Motivation and Emotion, 26*(3), 183-207. https://doi.org/10.1023/A:1021711629417
Reeve, J., Ryan, R. M., Deci, E. L., & Jang, H. (2007). Understanding and promoting autonomous self-regulation: A self-determination theory perspective. In D. H. Schunk & B. J. Zimmermann (Eds.), *Motivation and self-regulated learning: (re)theory, research, and applications* (pp. 223-244). New York: Taylor & Francis Group.

Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin, 26*, 419–435. https://doi.org/10.1177/0146167200266002

Rheinberg, F., & Engeser, S. (2010). Motive training and motivational competence. In O. C. Schultheiss & J. C. Brunstein (Eds.), *Implicit motives* (pp. 510–548). New York, NY: Oxford University Press.

Rheinberg, F., & Engeser, S. (2018). Intrinsic motivation and flow. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and action* (3 ed., pp. 579-622). Cham: Springer.

Rosenzweig, E. Q., Wigfield, A., & Eccles, J. S. (2022). Beyond utility value interventions: The why, when, and how for next steps in expectancy-value intervention research. *Educational Psychologist, 57*(1), 11-30. https://doi.org/10.1080/00461520.2021.1984242

Rozental, A., & Carlbring, P. (2014). Understanding and treating procrastination: A review of a common self-regulatory failure. *Psychology, 5*(13), 1488-1502. https://doi.org/10.4236/psych.2014.513160

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology, 43*(3), 450-461. https://doi.org/10.1037/0022-3514.43.3.450

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality and Social Psychology, 63*(3), 397-427. https://doi.org/10.1111/j.1467-6494.1995.tb00501.x

Ryan, R. M., Bernstein, J. H., & Brown, K. W. (2010). Weekends, work, and well-being: Psychological need satisfactions and day of the week effects on mood, vitality, and physical symptoms. *Journal of Social and Clinical Psychology, 29*(1), 95-122. https://doi.org/10.1521/jscp.2010.29.1.95

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology, 25*(1), 54-67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141-166. https://doi.org/10.1146/annurev.psych.52.1.141

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: does psychology need choice, self-determination, and will? *Journal of Personality, 74*(6), 1557-1585. https://doi.org/10.1111/j.1467-6494.2006.00420.x

Ryan, R. M., & Deci, E. L. (2008). From Ego Depletion to Vitality: Theory and Findings Concerning the Facilitation of Energy Available to the Self. *Social and Personality Psychology Compass, 2*(2), 702–717. https://doi.org/10.1111/j.1751-9004.2008.00098.x

Ryan, R. M., & Deci, E. L. (2019). Brick by Brick: The Origins, Development, and Future of Self-Determination Theory. In A. J. Elliot (Ed.), *Advances in Motivation Science* (Vol. 6, pp. 111-156): Elsevier.

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology, 61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Ryan, R. M., Donald, J. N., & Bradshaw, E. L. (2021). Mindfulness and Motivation: A Process View Using Self-Determination Theory. *Current Directions in Psychological Science, 30*(4), 300-306. https://doi.org/10.1177/09637214211009511

Ryan, R. M., & Frederick, C. (1997). On Energy, Personality, and Health: Subjective Vitality as a Dynamic Reflection of Well-Being. *Journal of Personality, 65*(3), 529-565. https://doi.org/10.1111/j.1467-6494.1997.tb00326.x

Sansone, C., & Thoman, D. B. (2005). Interest as the Missing Motivator in Self-Regulation. *European Psychologist, 10*(3), 175-186. https://doi.org/10.1027/1016-9040.10.3.175

Sansone, C., Weir, C., Harpster, L., & Morgan, C. (1992). Once a boring task always a boring task? Interest as a self-regulatory mechanism. *Journal of Personality and Social Psychology, 63*(3), 379-390. https://doi.org/10.1037/0022-3514.63.3.379

Scherbaum, C. A., & Ferreter, J. M. (2009). Estimating Statistical Power and Required Sample Sizes for Organizational Research Using Multilevel Modeling. *Organizational Research Methods, 12*(2), 347-367.
Schmidt, S. (2009). Shall we really do it again? The powerful concept of replication is neglected in the social sciences. *Review of General Psychology, 13*(2), 90-100. https://doi.org/10.1037/a0015108
Schuler, J., Wegner, M., & Knechtle, B. (2014). Implicit motives and basic need satisfaction in extreme endurance sports. *Journal of Sport and Exercise Psychology, 36*(3), 293-302. https://doi.org/10.1123/jsep.2013-0191
Schultheiss, O. C., & Brunstein, J. C. (1999). Goal Imagery: Bridging the Gap Between Implicit Motives and Explicit Goals. *Journal of Personality, 67*(1), 1-38. https://doi.org/10.1111/1467-6494.00046
Schultheiss, O. C., Jones, N. M., Davis, A. Q., & Kley, C. (2008). The role of implicit motivation in hot and cold goal pursuit: Effects on goal progress, goal rumination, and emotional well-being. *Journal of Research in Personality, 42*(4), 971-987. https://doi.org/10.1016/j.jrp.2007.12.009
Schwartz, S. J., & Waterman, A. S. (2006). Changing interests: A longitudinal study of intrinsic motivation for personally salient activities. *Journal of Research in Personality, 40*(6), 1119-1136. https://doi.org/10.1016/j.jrp.2005.12.003
Schwinger, M., Steinmayr, R., & Spinath, B. (2009). How do motivational regulation strategies affect achievement: Mediated by effort management and moderated by intelligence. *Learning and Individual Differences, 19*(4), 621-627. https://doi.org/10.1016/j.lindif.2009.08.006
Schwinger, M., & Stiensmeier-Pelster, J. (2012). Effects of motivational regulation on effort and achievement: A mediation model. *International Journal of Educational Research, 56*, 35-47. https://doi.org/10.1016/j.ijer.2012.07.005
Schwinger, M., von der Laden, T., & Spinath, B. (2007). Strategien zur Motivationsregulation und ihre Erfassung. *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie, 39*(2), 57-69. https://doi.org/10.1026/0049-8637.39.2.57
Sebire, S. J., Standage, M., & Vansteenkiste, M. (2009). Examining Intrinsic Versus Extrinsic Exercise Goals: Cognitive, Affective, and Behavioral Outcomes. *Journal of Sport & Exercise Psychology, 31*, 189-210. https://doi.org/10.1123/jsep.31.2.189
See, J. E., Howe, S. R., Warm, J. S., & Dember, W. N. (1995). Meta-analysis of the sensitivity decrement in vigilance. *Psychological Bulletin, 7*, 384-394. https://doi.org/10.1037/0033-2909.117.2.230
Sheldon, K. M. (2014). Becoming oneself: the central role of self-concordant goal selection. *Personality and Social Psychology Review, 18*(4), 349-365. https://doi.org/10.1177/1088868314538549
Sheldon, K. M., & Elliot, A. J. (1998). Not All Personal Goals Are Personal: Comparing Autonomous and Controlled Reasons for Goals as Predictors of Effort and Attainment. *Personality and Social Psychology Bulletin, 24*(5), 546-557 https://doi.org/10.1177/0146167298245010
Sheldon, K. M., & Houser-Marko, L. (2001). Self-Concordance, Goal Attainment, and the Pursuit of Happiness: Can There Be an Upward Spiral? *Journal of Personality and Social Psychology, 80*(1), 152-165. https://doi.org/10.1037/0022-3514.80.1.152
Sheldon, K. M., Ryan, R. M., & Reis, H. T. (1996). What Makes for a Good Day? Competence and Autonomy in the Day and in the Person. *Personality and Social Psychology Bulletin, 22*(12), 1270-1279. https://doi.org/10.1177/01461672962212007
Sheldon, K. M., & Schüler, J. (2011). Wanting, having, and needing: integrating motive disposition theory and self-determination theory. *Journal of Personality and Social Psychology, 101*(5), 1106-1123. https://doi.org/10.1037/a0024952
Sheldon, K. M., & Schüler, J. (2015). Agency and its Discontents: A Two-Process Perspective on Basic Psychological Needs and Motives. In M. Mikulincer, P. R. Shaver, M. L. Cooper, & R. J. Larsen (Eds.), *APA Handbook of Personality and Social Psychology, Volume 4: Personality processes and individual differences* (pp. 167-187). Washington, DC, US: American Psychological Association.

Shin, J., & Grant, A. M. (2019). Bored by interest: How intrinsic motivation in one task can reduce performance on other tasks. *Academy of Management Journal, 62*(2), 415-436. https://doi.org/10.5465/amj.2017.0735
Shiota, M. N., & Levenson, R. W. (2009). Effects of aging on experimentally instructed detached reappraisal, positive reappraisal, and emotional behavior suppression. *Psychology of Aging, 24*(4), 890-900. https://doi.org/10.1037/a0017896
Shiota, M. N., & Levenson, R. W. (2012). Turn down the volume or change the channel? Emotional effects of detached versus positive reappraisal. *Journal of Personality and Social Psychology, 103*(3), 416-429. https://doi.org/10.1037/a0029208
Silvestrini, N., & Gendolla, G. H. (2013). Automatic effort mobilization and the principle of resource conservation: one can only prime the possible and justified. *Journal of Personality and Social Psychology, 104*(5), 803-816. https://doi.org/10.1037/a0031995
Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology, 100*(4), 765-781. https://doi.org/10.1037/a0012840
Slemp, G. R., Kern, M. L., Patrick, K. J., & Ryan, R. M. (2018). Leader autonomy support in the workplace: A meta-analytic review. *Motivation and Emotion, 42*(5), 706-724. https://doi.org/10.1007/s11031-018-9698-y
Smets, E. M. A., Garssen, B., Bonke, B. D., & De Haes, J. C. J. M. (1995). The Multidimensional Fatigue Inventory (MFI) psychometric qualities of an instrument to assess fatigue. *Journal of psychosomatic research, 39*(3), 315-325. https://doi.org/10.1016/0022-3999(94)00125-O
Smyth, A. P., Werner, K. M., Milyavskaya, M., Holding, A. C., & Koestner, R. (2020). Do mindful people set better goals? Investigating the relation between trait mindfulness, self-concordance, and goal progress. *Journal of Research in Personality, 88*. https://doi.org/10.1016/j.jrp.2020.104015
Sokolowski, K. (1993). *Emotion und Volition [Emotion and volition]*. Göttingen: Hogrefe.
Stanislaw, H., & Todorov, N. (1999). Calculation of signal detection theory measures. *Behavior Research Methods, Instruments, & Computers, 31*(1), 137-149. https://doi.org/10.3758/BF03207704
Steingut, R. R., Patall, E. A., & Trimble, S. S. (2017). The effect of rationale provision on motivation and performance outcomes: A meta-analysis. *Motivation Science, 3*(1), 19-50. https://doi.org/10.1037/mot0000039
Stiensmeier-Pelster, J., & Heckhausen, H. (2018). Causal attribution of behavior and achievement. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and Action* (pp. 623-678). Cham: Springer.
Su, Y.-L., & Reeve, J. (2011). A Meta-analysis of the Effectiveness of Intervention Programs Designed to Support Autonomy. *Educational Psychology Review, 23*(1), 159-188. https://doi.org/10.1007/s10648-010-9142-7
Sweeney, A. M., & Freitas, A. L. (2017). Construing action abstractly and experiencing autonomy: Implications for physical activity and diet. *Motivation and Emotion, 42*(2), 161-177. https://doi.org/10.1007/s11031-017-9645-3
Thibault Landry, A., Kindlein, J., Trépanier, S.-G., Forest, J., Zigarmi, D., Houson, D., & Brodbeck, F. C. (2016). Why individuals want money is what matters: Using self-determination theory to explain the differential relationship between motives for making money and employee psychological health. *Motivation and Emotion, 40*(2), 226-242. https://doi.org/10.1007/s11031-015-9532-8
Thibault Landry, A., Zhang, Y., Papachristopoulos, K., & Forest, J. (2020). Applying self-determination theory to understand the motivational impact of cash rewards: New evidence from lab experiments. *International Journal of Psychology, 55*(3), 487-498. https://doi.org/10.1002/ijop.12612
Thoman, D. B., Sansone, C., & Geerling, D. (2017). The dynamic nature of interest: Embedding interest within self-regulation In P. O'Keefe & J. Harackiewicz (Eds.), *The science of interest* (pp. 27-47). Cham: Springer.

Trapp, J. K., & Kehr, H. M. (2016). How the influence of the implicit power motive on negotiation performance can be neutralized by a conflicting explicit affiliation motive. *Personality and Individual Differences, 94*, 159-162. https://doi.org/10.1016/j.paid.2015.12.036

Trépanier, S.-G., Forest, J., Fernet, C., & Austin, S. (2015). On the psychological and motivational processes linking job characteristics to employee functioning: Insights from self-determination theory. *Work & Stress, 29*(3), 286-305. https://doi.org/10.1080/02678373.2015.1074957

Troy, A. S., Ford, B. Q., McRae, K., Zarolia, P., & Mauss, I. B. (2017). Change the things you can: Emotion regulation is more beneficial for people from lower than from higher socioeconomic status. *Emotion, 17*(1), 141-154. https://doi.org/10.1037/emo0000210

Troy, A. S., Shallcross, A. J., & Mauss, I. B. (2013). A person-by-situation approach to emotion regulation: cognitive reappraisal can either help or hurt, depending on the context. *Psychol Sci, 24*(12), 2505-2514. https://doi.org/10.1177/0956797613496434

Uusberg, A., Taxer, J. L., Yih, J., Uusberg, H., & Gross, J. J. (2019). Reappraising Reappraisal. *Emotion Review, 11*(4), 267-282. https://doi.org/10.1177/1754073919862617

Van den Broeck, A., Howard, J. L., Van Vaerenbergh, Y., Leroy, H., & Gagné, M. (2021). Beyond intrinsic and extrinsic motivation: A meta-analysis on self-determination theory's multidimensional conceptualization of work motivation. *Organizational Psychology Review, 11*(3), 240-273. https://doi.org/10.1177/20413866211006173

van Eerde, W., & Klingsieck, K. B. (2018). Overcoming procrastination? A meta-analysis of intervention studies. *Educational Research Review, 25*, 73-85. https://doi.org/10.1016/j.edurev.2018.09.002

van Hooft, E. A. J., & van Hooff, M. L. M. (2018). The state of boredom: Frustrating or depressing? *Motivation and Emotion, 42*(6), 931-946. https://doi.org/10.1007/s11031-018-9710-6

Van Tilburg, W. A., & Igou, E. R. (2012). On boredom: Lack of challenge and meaning as distinct boredom experiences. *Motivation and Emotion, 36*(2), 181-194. https://doi.org/10.1007/s11031-011-9234-9

Vansteenkiste, M., Aelterman, N., De Muynck, G., Haerens, L., Patall, E. A., & Reeve, J. (2018). Fostering Personal Meaning and Self-relevance: A Self-Determination Theory Perspective on Internalization. *The Journal of Experimental Education, 86*(1), 30-49. https://doi.org/10.1080/00220973.2017.1381067

Vansteenkiste, M., Lens, W., Elliot, A. J., Soenens, B., & Mouratidis, A. (2014). Moving the Achievement Goal Approach One Step Forward: Toward a Systematic Examination of the Autonomous and Controlled Reasons Underlying Achievement Goals. *Educational Psychologist, 49*(3), 153-174. https://doi.org/10.1080/00461520.2014.928598

Vansteenkiste, M., Niemiec, C. P., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: an historical overview, emerging trends, and future directions. *16*, 105-165. https://doi.org/10.1108/s0749-7423(2010)000016a007

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 23*(3), 263-306. https://doi.org/10.1037/a0032359

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion, 44*(1), 1-31. https://doi.org/10.1007/s11031-019-09818-1

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology, 101*(3), 671-688. https://doi.org/10.1037/a0015083

Vasalampi, K., Parker, P., Tolvanen, A., Lüdtke, O., Salmela-Aro, K., & Trautwein, U. (2014). Integration of personality constructs: The role of traits and motivation in the willingness to exert effort in academic and social life domains. *Journal of Research in Personality, 48*, 98-106. https://doi.org/10.1016/j.jrp.2013.11.004

Vishkin, A., Hasson, Y., Millgram, Y., & Tamir, M. (2020). One Size Does Not Fit All: Tailoring Cognitive Reappraisal to Different Emotions. *Pers Soc Psychol Bull, 46*(3), 469-484. https://doi.org/10.1177/0146167219861432
Warm, J. S., Parasuraman, R., & Matthews, G. (2008). Vigilance requires hard mental work and is stressful. *Human Factors, 50*(3), 433-441. https://doi.org/10.1518/001872008X312152
Waterman, A. S. (2005). When Effort Is Enjoyed: Two Studies of Intrinsic Motivation for Personally Salient Activities. *Motivation and Emotion, 29*(3), 165-188. https://doi.org/10.1007/s11031-005-9440-4
Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: a meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin, 138*(4), 775-808. https://doi.org/10.1037/a0027600
Werner, K. M., & Milyavskaya, M. (2019). Motivation and self-regulation: The role of want-to motivation in the processes underlying self-regulation and self-control. *Social and Personality Psychology Compass*, e12425. https://doi.org/10.1111/spc3.12425
Werner, K. M., Milyavskaya, M., Foxen-Craft, E., & Koestner, R. (2016). Some goals just feel easier: Self-concordance leads to goal progress through subjective ease, not effort. *Personality and Individual Differences, 96*, 237-242. https://doi.org/10.1016/j.paid.2016.03.002
Westgate, E. C. (2020). Why Boredom Is Interesting. *Current Directions in Psychological Science, 29*(1), 33-40. https://doi.org/10.1177/0963721419884309
Winter, D. G., John, O. P., Stewart, A. J., Klohnen, E. C., & Duncan, L. E. (1998). Traits and motives: toward an integration of two traditions in personality research. *Psychological Review, 105*(2), 230-250. https://doi.org/10.1037/0033-295X.105.2.230
Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist, 38*(4), 189-205. https://doi.org/10.1207/S15326985EP3804_1
Wolters, C. A., & Benzon, M. B. (2013). Assessing and Predicting College Students' Use of Strategies for the Self-Regulation of Motivation. *The Journal of Experimental Education, 81*(2), 199-221. https://doi.org/10.1080/00220973.2012.699901
Wood, W. (2017). Habit in Personality and Social Psychology. *Personality and Social Psychology Review, 21*(4), 389-403. https://doi.org/10.1177/1088868317720362
Woolley, K., & Fishbach, A. (2015). The experience matters more than you think: People value intrinsic incentives more inside than outside an activity. *Journal of Personality and Social Psychology, 109*(6), 968-982. https://doi.org/10.1037/pspa0000035
Yeager, D. S., Henderson, M. D., Paunesku, D., Walton, G. M., D'Mello, S., Spitzer, B. J., & Duckworth, A. L. (2014). Boring but important: a self-transcendent purpose for learning fosters academic self-regulation. *Journal of Personality and Social Psychology, 107*(4), 559-580. https://doi.org/10.1037/a0037637
Zeier, P., Sandner, M., & Wessa, M. (2019). Script-based Reappraisal Test introducing a new paradigm to investigate the effect of reappraisal inventiveness on reappraisal effectiveness. *Cogn Emot, 34*(4), 793-799. https://doi.org/10.1080/02699931.2019.1663153

Appendix: Information on the App Pocket Report

Pocket Report wird entwickelt von der yathos Unternehmergesellschaft (haftungsbeschränkt).

Informationen zum Datenschutz (Stand Juni 2019):

- Der Pocket Report Server ist bei der Hetzner Online GmbH gemietet und steht in Falkenstein/Vogtl. in Sachsen.
- Die Daten sind zu unterteilen in:
    a) Unverschlüsselte Daten = die Studienmetadaten, die Teilnehmertokens, die Fragebögen, deren Umfragezeitpunkt. Diese sind von den berechtigten Nutzern (= Studienleiter und auch teilweise die Teilnehmer, da diese den Fragebogen sehen müssen um ihn auszufüllen) und von yathos einsehbar.
    b) Verschlüsselte Daten = die Antworten der Teilnehmer. Diese sind ausschließlich vom Inhaber des beim Anlegen der Studie generierten Schlüssels lesbar (= Studienleiter). Ohne diesen Schlüssel kann niemand die Daten lesen.
- Pocket Report erfasst außer den eigentlichen Frageantworten keine zusätzlichen Daten (wie Ort oder Kontakte, oder sonstige auf dem Handy gespeicherte Daten). Lediglich der Zeitpunkt zu dem die Antworten gegeben wurden wird erfasst. Die Daten werden bis zur Übertragung auf den Server auf dem Gerät gespeichert (falls das Versenden der Antworten nicht sofort funktioniert, sind diese damit nicht verloren).
- Jede Verbindung zwischen Handy und Server ist über HTTPS verschlüsselt, sodass niemand die übertragenen Daten lesen kann. Die Antworten der Teilnehmer werden schon auf dem Gerät verschlüsselt sodass yathos die Daten niemals einsehen kann.

Die Gesellschaft:
yathos Unternehmergesellschaft (haftungsbeschränkt)
Dauthendeystraße 2
81377 München

Sitz der Gesellschaft
Konrad-Zuse-Straße 15
85716 Unterschleißheim

HRB 199640 - Amtsgericht München
USt-IdNr: DE283764997

Geschäftsführer:
Ludwig Eisgruber
Hubert Niedermeier

Kontakt:
Email ludwig.eisgruber@yathos.de
Mobil +49 151 40512329
Telefon +49 89 2093 4843