© *Academy of Management Journal*
2021, Vol. 64, No. 3, 772–798.
https://doi.org/10.5465/amj.2018.1471

WHEN PUTTING WORK OFF PAYS OFF: THE CURVILINEAR RELATIONSHIP BETWEEN PROCRASTINATION AND CREATIVITY

JIHAE SHIN
Yale University

ADAM M. GRANT
University of Pennsylvania

Although it is widely assumed that procrastination is counterproductive, delaying task progress may have hidden benefits for creativity. Drawing on theories of incubation, we propose that moderate procrastination can foster creativity when employees have the intrinsic motivation and opportunity to generate new ideas. In two experiments in the United States, we tempted participants to engage in varying degrees of procrastination by making different numbers of funny YouTube videos easily accessible while they were supposed to be solving business problems. Participants generated more creative ideas in the moderate rather than low or high procrastination conditions. This curvilinear effect was partially mediated by problem restructuring and the activation of new knowledge. We constructively replicated and extended the curvilinear effect in a field study with Korean employees: procrastination predicted lower task efficiency but had an inverted-U-shaped relationship with creativity. Employees who procrastinated moderately received higher creativity ratings from their supervisors than employees who procrastinated more or less, provided that intrinsic motivation or creative requirement was high. We discuss theoretical and practical implications for time management, creativity, and motivation in organizations.

People are constantly putting things off (Ferrari, 2001; Ferrari, O'Callaghan, & Newbegin, 2005; Steel, 2007). About 20% of the general population is under the influence of chronic procrastination (Hammer & Ferrari, 2002; Harriott & Ferrari, 1996; McCown & Johnson, 1989) and as many as 80% to 95% of college students admit to procrastinating (Ellis & Knaus, 1979; Steel, 2010). Procrastination is especially prevalent in the workplace, where there are explicit tasks to be carried out within a given time frame (Ferrari, Johnson, & McCown, 1995; Harris & Sutton, 1983).

The common view on procrastination is that it is counterproductive (Baumeister & Heatherton, 1996; Burka & Yuen, 1983; Ferrari, 1992; Harris & Sutton, 1983; Knaus, 1998; Steel, 2007, 2010). Procrastination is seen as a form of self-regulatory failure (Baumeister & Heatherton, 1996; Knaus, 2000; Senécal, Koestner, & Vallerand, 1995; Wolters, 2003) that results in negative performance and personal outcomes and needs to be overcome (Burka & Yuen, 1983; Ellis & Knaus, 1979; Knaus, 1998; Steel, 2010). Existing empirical evidence supports this view, as procrastination has been linked to lower work performance (Nguyen, Steel, & Ferrari, 2013; Robb, 1998), lower academic performance (Beswick, Rothblum, & Mann, 1988; Steel, Brothen, & Wambach, 2001), and negative financial outcomes such as overpayment of taxes (Kasper, 2004).

In focusing primarily on the negative consequences of procrastination, scholars have largely overlooked the possibility that procrastination may have advantages. In particular, creativity, defined as the generation of novel and useful ideas (Amabile, 1988, 1996; Oldham & Cummings, 1996), is an aspect of performance that operates through a different set of antecedents and mechanisms than task efficiency (George, 2007; Shalley, Zhou, & Oldham, 2004) or productivity (Van Dyne, Jehn, & Cummings, 2002). This leaves open the possibility that procrastination does not undermine creativity as it does task efficiency or productivity. In this paper, we explore the possibility that moderate procrastination enhances creativity through facilitating incubation.

Several scholars have raised the idea that procrastination might have benefits for creativity. Van Eerde (2000: 382) wrote that "procrastination may lead to

For their excellent feedback, we thank Associate Editor Markus Baer, Sigal Barsade, Nancy Rothbard, and three anonymous reviewers.

better task performance in creative tasks, or tasks involving the search for information." In addition, Harris and Sutton (1983: 994) suggested that "procrastination might lead to positive outcomes for people in highly challenging jobs that require creative thought." These scholars reasoned that procrastination may provide extra time in which novel insights can be acquired, and in that sense, the time spent procrastinating might not be completely wasted, as it may result in unexpected progress on the avoided task (Van Eerde, 2000, 2003; see also Torrance & Safter, 1991). Further, in a qualitative study of Westinghouse Talent Search winners in adulthood, those engaged in creative work procrastinated regularly (Subotnik, Steiner, & Chakraborty, 1999). Anecdotally, Leonardo da Vinci is known to have been an inveterate procrastinator (Pannapacker, 2009), and there is evidence that Albert Einstein, Thomas Edison, and Frank Lloyd Wright engaged in procrastination (Beerbohm, 1957; McGuirk, 1997; Steel, 2007). Writer Margaret Atwood has acknowledged that she often spends "the morning procrastinating and worrying, and then plunges into the manuscript in a frenzy of anxiety around 3:00pm" (Oates, 1983: 89), but she has won numerous awards for her creativity and published more than five dozen books—including *The Handmaid's Tale*. While these scholarly speculations and anecdotal clues suggest that there may be conditions under which procrastination is conducive to creativity, this idea has yet to be theoretically developed or empirically tested.

In this paper, we develop new insights about the effect of procrastination on creativity, the incubation processes that mediate this effect, and the boundary conditions that moderate this effect. Whereas creativity researchers have hinted at a linear effect, we propose that procrastination has a curvilinear, inverted-U-shaped effect on creativity, mediated by incubation processes and moderated by intrinsic motivation and creative requirement. Drawing on theories of incubation and time, we examine how moderate procrastination may promote problem restructuring and the activation of new knowledge. Since the first few ideas that people generate are often their most conventional ideas (Lucas & Nordgren, 2015), when employees do not procrastinate, they are at risk of foreclosing on relatively obvious initial options. Under moderate procrastination, employees have greater freedom for incubation, which allows them to consider the problem through fresh lenses and access remote knowledge and information. However, when procrastination is high, when employees finally start making progress on the task, their incubation will be constrained, as they will be prone to construing the task narrowly and concretely (Trope & Liberman, 2003) and feel the urge to solve the problem now (Baer & Oldham, 2006; Humphrey, Moon, Conlon, & Hofmann, 2004). We further predict that moderate procrastination will only enhance creativity when employees have the intrinsic motivation or opportunity to be creative, which is when they have a reason to keep the task in the back of their minds while procrastinating moderately.

We test these hypotheses in three studies. In two laboratory experiments, we randomly assign participants to the temptation to engage in different levels of procrastination, assess creativity with independent ratings of final business proposals, and examine the incubation mediating mechanisms by coding the ideas participants explore during brainstorming. In a field study, we constructively replicate the curvilinear relationship between procrastination and creativity with survey data on procrastination from employees at a Korean furniture company and supervisor ratings of creativity and task efficiency and test the boundary conditions of intrinsic motivation and creative requirement.

Our theoretical perspective and empirical findings make important contributions to the literature on time management, creativity, and motivation. We demonstrate that although it is detrimental to task efficiency, moderate procrastination can enhance creativity, thereby challenging the widespread assumption that procrastination is always counterproductive. In doing so, we identify moderate procrastination as an individual action that can increase creativity in the presence of intrinsic motivation and opportunities to develop novel solutions to problems, answering calls for new research on the behavioral antecedents of creativity (Runco, 2004) and curvilinear relationships more generally (Grant & Schwartz, 2011; Pierce & Aguinis, 2013). Our research is not intended to license procrastination, but rather to normalize it as a potentially productive part of the creative process under special circumstances—where the delays are moderate and the problem is interesting or a new solution is needed.

PROCRASTINATION AND CREATIVITY

Our research explores procrastination in the context of work that is temporally bound by an internal or external deadline. Procrastination is the act of intentionally delaying task progress or completion with the understanding that doing so may come at a cost (Ferrari, 2001; Schraw, Wadkins, & Olafson, 2007; Van Eerde, 2000). Procrastination differs from other forms of delay in two key ways (Steel, 2007).

First, it involves the voluntary act of putting off a task, rather than being forced by constraints such as a computer crashing or a flight being delayed. Second, it involves postponing the initiation, advancement, or completion of a task with the awareness that there may be a downside to that action.

While some past definitions of procrastination include the idea that procrastination results in negative outcomes (see Milgram, 1991), it is important to separate the construct of procrastination from its presumed consequences. Rather than assuming that procrastination is always dysfunctional, it is critical to theoretically develop and empirically test the consequences of procrastination. Indeed, procrastination has not always had a negative connotation (Ferrari, Johnson, & McCown, 1995). The word "procrastination" comes from the Latin verb "procrastinare," which means "to put off or postpone until another day" (DeSimone, 1993: 10). This word is a combination of the Latin prefix "pro," meaning "forward or in favor of," and the root "crastinus," meaning "of tomorrow" (Klein, 1971: 1246). This reveals that the word itself does not contain a subpart that is associated with a negative meaning. Ancient Egyptians had two verbs that have been translated as meaning "to procrastinate": one referring to "laziness" in completing necessary tasks, but another referring to the useful course of action to avoid "unnecessary work and impulsive effort" (DeSimone, 1993; Ferrari et al., 1995: 4). Further, Romans used the term procrastination to refer to "sophisticated decision making regarding when not to act," such as knowing when to wait for the right time to deploy a war strategy (Ferrari et al., 1995: 4). These classic uses of the word reinforce that, in its origin, procrastination was not exclusively seen as a negative behavior. Consequently, some contemporary scholars have argued that the negative connotations of the term procrastination emerged only after the time of the Industrial Revolution; as technology advanced, efficiency and schedule adherence became increasingly important (Ferrari et al., 1995; Milgram, 1992). As such, when the primary goal is not efficiency, it is possible that procrastination may have unexpected benefits (Anderson, 2016).

Our focus is on the role of procrastination in creativity—the production of ideas that are both novel and useful (Amabile, 1983, 1996). We are specifically interested in how procrastination influences the generation of creative ideas as opposed to the evaluation, development, or implementation of those ideas. While procrastinating, employees are delaying progress on a task when it feels potentially costly, but they may still be thinking about it consciously or processing it subconsciously. Drawing on theories of incubation and time, we propose that moderate procrastination can enhance creativity by facilitating the incubation mechanisms of problem restructuring and the activation of new knowledge. Problem restructuring is the process of reframing and organizing one's mental representation of the task, and the activation of new knowledge refers to discovering novel information or accessing information that has been stored but not previously retrieved from memory (Sio & Ormerod, 2009). It has long been established that creativity often arises from framing a problem differently (Csikszentmihalyi & Getzels, 1971) and drawing upon remote information in solving it (Guilford, 1957).

Incubation Mechanisms

We propose that procrastination influences the timing and extent of incubation. When employees do not procrastinate at all, they start making progress on the task immediately after learning about it, which restricts both problem restructuring and the activation of new knowledge. Recent experiments have suggested that idea generation often begins with relatively obvious ideas (Lucas & Nordgren, 2015), which can constrain later creativity (Berg, 2014). Stuck on the initial framing of the task problem and limited to easily accessible knowledge, employees may be prone to linear thinking and end up "seizing and freezing" on an early conventional idea (Kruglanski & Webster, 1996). Indeed, people often rush into tasks by precrastinating or "grabbing the 'low-hanging fruit'" (Rosenbaum, Gong, & Potts, 2014: 1494) (see also Rosenbaum et al., 2019; Wasserman, 2018). This is also known as "plunging-in bias," where employees fail to sufficiently understand the problem and explore a range of possible solutions before diving in to implement one (Bhardwaj, Crocker, Sims, & Wang, 2018). Recent research has suggested that it is not only individuals who engage in extensive procrastination who struggle to finish tasks on time; individuals who precrastinate also encounter difficulties with time management (Vangsness & Young, 2020). Classic research on the Einstellung effect (Luchins, 1940) has suggested that people tend to "persist with the same approach to a problem or a series of problems whether or not that approach is productive" (Gersick, 1994: 12). The absence of procrastination may thereby significantly limit incubation, resulting in a less creative outcome.

In contrast, when employees procrastinate moderately, they start making progress on the task later—around the middle of the task timeline. Research on the psychology of time has suggested that making progress away from the task introduction and the task deadline can enhance problem restructuring and the activation of new knowledge. Moderate procrastination creates psychological distance from the task, establishing both temporal and spatial separation and thereby increasing the likelihood of thinking abstractly about the nature of the problem and why it exists, rather than focusing concretely on how to solve it as presented (Soderberg, Callahan, Kochersberger, Amit, & Ledgerwood, 2015; Trope & Liberman, 2010).

After procrastinating moderately, employees are in a position to think about the task problem away from the bind of the initial framing and the salience of the deadline. They are likely to break free from the existing problem structure (George, 2007) as their minds wander to new and unusual ways of viewing a problem (Baird, Smallwood, Mrazek, Kam, Franklin, & Schooler, 2012). Indeed, George (2007: 447) suggested that "time away from active engagement in a particular task allows one to approach it anew upon returning to it and potentially from a different vantage point or mental set from which new information and insights might come to light." This gives them an opportunity to reframe the problem and explore a range of potential solutions, both consciously and subconsciously (Van Eerde, 2000, 2003). Accordingly, insofar as it encourages employees to subconsciously or consciously explore different ways of approaching the problem, moderate procrastination can lead employees to generate more creative ideas.

Moderate procrastination is also likely to promote the activation of new knowledge. While procrastinating moderately, employees are less focused on actively solving the problem (Van Eerde, 2003), which means that goal shielding (Shah, Friedman, & Kruglanski, 2002) is weakened and they are more likely to access remote knowledge. In a state of defocused attention, employees are more likely to make unexpected leaps to less obviously relevant information (Dane, 2011; Dijksterhuis & Meurs, 2006; Dijksterhuis & Nordgren, 2006; Wieth & Zacks, 2011). Indeed, in a qualitative study, Subotnik et al. (1999: 154) found that precocious scientists "used procrastination as a form of incubation to stave off a premature choice of a scientific problem or solution." For example, one scientist explained that "in scientific work, ideas need time to mature. I am often impulsive and my impulses have been wrong," and described procrastination as a way to "restrain that urge to respond prematurely." These scientists may have been waiting for remote knowledge and novel information to become cognitively accessible. Taken together, these arguments suggest that moderate procrastination helps employees strike a creative balance between imagination-inducing and closure-seeking behaviors.

However, the beneficial effect of moderate procrastination is unlikely to extend to high procrastination. There are both cognitive and affective reasons to expect that high procrastination will constrain incubation. When employees procrastinate extensively, they start making progress on the task only after deadlines begin to loom large. When progress is made close to the task deadline, incubation may be restricted. From a cognitive perspective, at this point, the goal of completion (Conlon & Garland, 1993) will interfere with both conscious and subconscious incubation processes. Employees are likely to miss out on conscious incubation because their active attention is focused on finding an immediate solution rather than the most creative solution. This puts them in an implementation mindset rather than a deliberative mindset (Gollwitzer & Bayer, 1999): they are likely to devote less energy to restructuring the problem and considering new knowledge. As they race to solve the problem, they are also likely to miss out on subconscious incubation, as they do not have a break or distraction to allow those processes to operate (George, 2007). This will limit them to top–down, convergent processing within the existing problem frame and the knowledge that is already salient (Dijksterhuis & Meurs, 2006; Dijksterhuis & Nordgren, 2006), preventing them from accessing the bottom–up, divergent, higher-capacity processing of subconscious incubation (George, 2007).

In addition, as employees procrastinate longer, the ensuing temporal immediacy is likely to hinder incubation by causing them to construe the problem more concretely rather than abstractly. Evidence has indicated that chronic procrastinators tend to construe tasks concretely (Dewitte & Lens, 2000). Further, research has shown that temporal immediacy can hinder creativity by leading to more concrete rather than abstract construals (Förster, Friedman, & Liberman, 2004). As the stopping point for the task approaches, employees become more focused on the concrete details of how to solve the problem (Trope & Liberman, 2003) and are less likely to adopt the abstract construals that are so often necessary to discover new ways of structuring the problem and incorporate more remote and diverse sources of

information. With moderate procrastination, employees experience enough temporal distance to construe the task abstractly (Soderberg et al., 2015), which allows them to incubate different possibilities for structuring the problem and activate new knowledge.

From an affective perspective, by the time high procrastinators start contemplating the task, their emotional states are likely to interfere with incubation. It has long been observed that "good things satiate and bad things escalate" (Coombs & Avrunin, 1977: 224). As employees procrastinate more and more, they delay starting the incubation process, while the cost of time pressure may intensify. When employees wait until the last minute before working on the problem, the ensuing time pressure can narrow attentional focus, which has been empirically linked to reduced creativity (Baer & Oldham, 2006). High procrastination is likely to activate goal shielding (Shah et al., 2002), blocking out information that does not appear relevant to completing the task. The urge to solve the given problem as soon as possible (Humphrey et al., 2004) may result in a state of threat rigidity, whereby employees focus on familiar, tried-and-true solutions rather than taking the risk of trying something new (Staw, Sandelands, & Dutton, 1981). Instead of being energized by the prospect of innovation, high procrastinators are likely to be overwhelmed by the details of implementation (McCrea, Liberman, Trope, & Sherman, 2008). High procrastination may thereby constrain incubation, hindering creativity. By comparison, moderate procrastination is likely to promote creative incubation by freeing employees from the constraints of task completion goals, concrete construals, time pressure, and threat rigidity. Without pacing challenges and looming deadlines, they have the flexibility to consciously and subconsciously restructure the problem and activate new knowledge that is remote from the conventional framing of the task.

Hypothesis 1. Procrastination has an inverted-U-shaped effect on creativity, such that moderate procrastination leads to higher creativity than low or high procrastination.

Hypothesis 2. The curvilinear effect of procrastination on creativity is mediated by (a) problem restructuring and (b) the activation of new knowledge.

Task and Motivational Moderators

The curvilinear effect of procrastination on creativity has important boundary conditions. To explore these conditions, we draw on theories of self-determination (Ryan & Deci, 2000) and motivational equifinality (Kruglanski, Chernikova, Babush, Dugas, & Schumpe, 2015). Although moderate procrastination may provide employees with the opportunity to incubate, we predict that whether they leverage this opportunity in service of creativity depends on the nature of their motivation and the task at hand. More specifically, we expect that the curvilinear effect of procrastination on creativity is most likely to emerge when employees are intrinsically motivated or working under high creative requirements.

Intrinsic motivation is the desire to work on a task based on interest and enjoyment (Amabile, 1993; Gagné & Deci, 2005). A core premise of self-determination theory is that when employees are intrinsically motivated, they are naturally drawn toward engaging with a task because they find it satisfying and rewarding (Ryan & Deci, 2000). Research has suggested that when employees are intrinsically motivated, they approach their tasks with heightened curiosity, cognitive flexibility, and effort and persistence (for a review, see Grant & Berry, 2011). Although intrinsic motivation has been empirically linked to lower procrastination, the two variables are not tightly coupled (Steel, 2007). Intrinsic motivation can fluctuate within tasks and over time (Shin & Grant, 2019; Vallerand, 1997, 2001), and intrinsically motivated employees may still procrastinate when the current task is difficult or daunting (Subotnik et al., 1999) or when they find another activity even more interesting (Pannapacker, 2009). As such, we do not expect that intrinsic motivation will always prevent procrastination but that it will affect what happens when an employee's attention is shifted away from the focal task.

Theoretically, one of the fundamental functions of motivation is to direct attention (Mitchell & Daniels, 2003). When employees are procrastinating moderately, their levels of intrinsic motivation will influence whether they direct partial attention toward the focal task. On the one hand, when employees lack intrinsic motivation, they are likely to view time away from the task as an escape from work altogether. They will take their lack of interest as a signal to avoid thinking about the focal task (Martin, Ward, Achee, & Wyer, 1993). On the other hand, self-determination theory has suggested that when employees find the delayed task intrinsically motivating, they will be more likely to keep the task problems in the back of their minds while they are procrastinating moderately, as their enthusiasm for the task maintains their interest (Parker, Bindl, & Strauss, 2010) and draws their

attention to novelty (Silvia, 2008). In the course of a workday, intrinsically motivated employees may procrastinate by doing mindless tasks that involve low performance pressure and cognitive difficulty, which frees up their energy and attention for incubation (Elsbach & Hargadon, 2006; George, 2007). Intrinsically motivated employees are also more likely to view obstacles as challenges rather than setbacks (Amabile, 1996), which drives them to keep the task in the back of their minds rather than disengaging altogether, allowing for problem restructuring and the activation of new knowledge to occur under moderate procrastination.

However, if intrinsic motivation is lacking, the requirement to be creative may serve as a substitute for channeling moderate procrastination into creativity. Creative requirement is the extent to which an employee's work allows for and necessitates the generation of novel ideas (Morgeson & Humphrey, 2006; Unsworth, Wall, & Carter, 2005). Creativity is a goal for some managers and in some jobs (Shalley, Gilson, & Blum, 2000), whereas in others, it is not expected and may even be forbidden (Mainemelis, 2010). In general, creative tasks are conducive to intrinsic motivation (Amabile, 1996). Nevertheless, it is possible to be intrinsically motivated when creative requirements are low, and it is possible to lack intrinsic motivation when creative requirements are high (Gagné & Deci, 2005). According to self-determination theory (Ryan & Deci, 2000), intrinsic motivation depends on fulfilling basic psychological motives for autonomy, competence, and relatedness. In the absence of creative requirements, employees may experience intrinsic motivation when they have discretion around what, when, where, how, and with whom to work, when they possess a sense of efficacy or mastery, and when they feel supported by others (Gagné & Deci, 2005). Even in the presence of creative requirements, intrinsic motivation is likely to be stifled if employees lack freedom of choice, feel incompetent, or feel devalued (Ryan & Deci, 2000). These divergences of intrinsic motivation and creative requirements make it possible for them to interact, and we propose that a creative requirement will compensate for a lack of intrinsic motivation to promote the curvilinear effect of procrastination on creativity.

Self-determination theory has suggested that motivation exists on a continuum of autonomous regulation, with pure intrinsic motivation involving engagement with the task as an end in and of itself while varying degrees of extrinsic motivation are fueled by a focus on the consequences of the task (Gagné & Deci, 2005). Extrinsic motivation can involve a desire to invest effort in a task because it is central to an employee's value system and self-concept (integrated regulation), it fulfills one of their values or identities (identified regulation), it allows them to enhance their self-esteem or prevent guilt (introjected regulation), or it enables them to obtain rewards or avoid punishment (external regulation) (Ryan & Deci, 2000). When a job involves high creative requirements, because novel and useful ideas are valued, employees are more likely to become attached to the goal of being creative (Shalley, 1991). Once they adopt that extrinsic goal, even if employees are not intrinsically motivated by the work itself, they will be concerned with achieving the external, introjected, identified, or integrated rewards of succeeding in generating creative ideas. Even if they are not energized to be creative, they have a reason to do so (Parker et al., 2010).

When employees engage in moderate procrastination, creative requirements will encourage them to keep the problem in the back of their minds, even if they are not intrinsically motivated to do so (Unsworth, 2001). They may not want to continue pondering the task, but they will feel that they should (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998). In pursuit of the intrapsychic, impression management, or tangible rewards associated with developing creative ideas, partial attention is allocated to the task problem while engaging in other activities, allowing problem restructuring and the activation of new knowledge to occur under moderate procrastination. Indeed, research has shown that incubation is most likely to yield creative ideas when the task requires divergent thinking (Sio & Ormerod, 2009). Creative requirements will prevent employees from disengaging from the focal task altogether while procrastinating moderately.

We expect that intrinsic motivation and creative requirements will serve as substitutes, not complements or enhancers. According to self-determination theory, autonomous regulation requires either interest or reasons, but not both (Ryan & Deci, 2000). When it comes to different types of motivation, more is not necessarily better: it is the quality, not the quantity, that seems to matter most (Grant, Nurmohamed, Ashford, & Dekas, 2011; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). As Gagné and Deci (2005: 353) summarized, "people tend to be autonomously motivated when a task is either interesting (and thus intrinsically motivating) or personally important (and thus autonomously extrinsically motivating)." This is known as motivational equifinality, where "one goal is served by several substitutable

means" (Kruglanski et al., 2015: 69). Intrinsic motivation is the perceived fusion of means and ends, such that an activity is its own goal (Kruglanski et al., 2018), but in the absence of that fusion, viewing the ends as worthwhile is a substitute (Yeager et al., 2014). Indeed, research has suggested that intrinsic motivation for a given behavior and a context supporting that behavior can operate as substitutes (Llopis & Foss, 2016). When a creative requirement is lacking, it is intrinsic motivation that will induce incubation for moderate procrastinators. When a creative requirement is present, even if they are not interested in the means of solving the problem, they are likely to care enough about the ends to keep the task in the back of their minds, enabling reframing of the problem and the activation of new knowledge. Taken together, these arguments suggest that moderate procrastination will promote creativity in the presence of intrinsic motivation and/or creative requirements.

Hypothesis 3. The curvilinear effect of procrastination on creativity is jointly moderated by intrinsic motivation and creative requirement, such that moderate procrastination is beneficial to creativity as long as intrinsic motivation and/or creative requirement is high, but it is not beneficial to creativity when both intrinsic motivation and creative requirement are low.

Overview of the Present Research

We test these hypotheses in two experiments and a field study. The experimental method facilitates causal inference and investigates key mediating mechanisms of the curvilinear procrastination–creativity effect, providing internal validity. The field study examines the curvilinear procrastination–creativity relationship in a work organization with boundary conditions, providing external validity. In Study 1, we test Hypothesis 1, examining whether tempting participants to engage in moderate rather than low or high procrastination increases creativity. In Study 2, we replicate the curvilinear effect with a different sample and creativity task and test Hypotheses 2a and 2b by examining the incubation mechanisms of problem restructuring and the activation of new knowledge. In Study 3, we test Hypotheses 1 and 3 in the field, constructively replicating the curvilinear relationship with self-reported procrastination and supervisor-rated creativity in a furniture company and investigate whether this relationship depends on intrinsic motivation and creative requirements.

STUDY 1: METHOD

Sample, Design, and Procedures

We conducted a laboratory experiment in the behavioral lab of a large U.S. university. The participants were 119 undergraduate students, 77% female, with an average age of 20 (SD = 2.21). We paid them $12 for an hour of their time. We randomly assigned participants to one of three temptation conditions (low procrastination, moderate procrastination, high procrastination).

The task was to write a business proposal for a student entrepreneur who had just won $10,000 to start his own online company. In the brainstorming phase of the task, participants were asked to write down "all the ideas that come to mind" in the space provided. In the proposal phase, they were asked to choose one idea and write a business proposal on it, which allowed us to assess creativity.

Procrastination manipulation. We manipulated procrastination indirectly by tempting participants to engage in different levels of procrastination. We developed a way of encouraging participants to put off the business proposal task voluntarily in favor of engaging in a potentially costly activity without explicitly directing them to do so. One of the most frequent sites of procrastination is YouTube (Myrick, 2015), with one survey estimating that employees spend 77 minutes a day watching videos that are unrelated to work (Purtill, 2017). To motivate participants to procrastinate, we made funny YouTube videos available for participants to watch instead of working on the business proposal. To prevent demand characteristics that might arise from participants realizing that the true focus of the experiment was on procrastination, we created a cover story—we included the funny videos as part of the student entrepreneur's bio.

In all three conditions, participants read the bio of Mike Goodman, a student from the Midwest majoring in business who was interested in becoming an entrepreneur. They read that his hobbies included singing, hiking, and playing the piano, and he also had a link to the entertainment industry as his older brother was a senior producer for Saturday Night Live. A fun fact embedded in the bio was that Mike originally came up with the idea for Jimmy Kimmel's "Mean Tweets" segment—short, funny video montages in which celebrities read nasty tweets about them from strangers out loud.

We included some of Mike's favorite segments below the bio. Since these videos have been extremely popular—many of them have over 50 million

views—we expected that the participants might be tempted to put off working on the business proposal task to watch the clips. To induce three different levels of procrastination (low, moderate, high), we made a different number of funny videos visible on the task page in each condition. In the low procrastination condition, one video was embedded on the task page. In the moderate procrastination condition, four videos were embedded on the task page. In the high procrastination condition, eight videos were embedded on the task page.

To prevent confounds, we gave all participants 30 minutes for the task and held constant the total number and content of funny videos available across conditions. For all participants, at the bottom of the task page, there was a link to view more videos, and the number varied by condition in reverse proportion to the number of embedded videos. Thus, across conditions, participants had access to nine videos during the task; the key difference was the salience and ease of access.

In the moderate procrastination condition, participants were introduced to the task and presented with the student entrepreneur's bio which contained four embedded videos, and the link at the bottom of the page led to five more videos. In the high procrastination condition, the experience was the same, except that eight videos were visible on the page and the link only pointed to one more. In the low procrastination condition, just one video was visible on the page and the link went to eight more.

In a pretest, the average number of videos watched was four in the moderate procrastination condition and one in the low procrastination condition. To rule out the possibility that any differences in creativity in the two conditions would be driven by watching four funny videos, we had participants in the low procrastination condition watch four funny videos before they were introduced to the task. That way, if we observed heightened creativity in the moderate procrastination condition, it would be caused by the time spent procrastinating rather than by the four funny videos watched.

Measures

Creativity of business proposals. We recruited two independent raters to assess the creativity of the participants' business proposals. The raters were two trained research assistants—graduate students in a business school who have taken management and entrepreneurship courses. We informed them that creativity is defined by the production of novel and useful ideas (Amabile, 1983) but did not disclose the purpose of the experiment, the hypotheses, or the experimental conditions. We provided the task instructions and participants' business proposals in an Excel file stripped of all identifying information. These raters were asked to evaluate the final proposals on a 7-point Likert-type scale anchored at 1 (*not at all creative*), 4 (*somewhat creative*), and 7 (*very creative*) (Goncalo & Staw, 2006; Grant & Berry, 2011). Since the two raters achieved good reliability (ICC2 = .94, $p < .001$) and agreement (average deviation = .26 [LeBreton & Senter, 2008]), we averaged the two raters' scores to form a single measure of creativity for each participant. For example, a business proposal for "an online consultant business for people looking to build tiny houses" was deemed very creative, and a business proposal for "start one's own YouTube channel" was deemed not at all creative.

Quantity vs. quality. To provide initial insights into whether any creativity effects were driven by the quality or quantity of the ideas explored during brainstorming, we enlisted two different coders to rate participants' initial ideas from the brainstorming phase for originality, flexibility, and fluency (Guilford, 1957). They assessed originality—the degree to which ideas explored are unique—by rating the extent to which each idea was unique and uncommon, achieving good reliability (ICC2 = .79, $p < .001$) and agreement (average deviation = .50). They assessed flexibility—the variety of categories of ideas explored—by counting the number of different categories that participants considered (e.g., Lu, Akinola, & Mason, 2017), achieving good reliability (ICC2 = .92, $p < .001$) and agreement (average deviation = .47). We aggregated the two coders' scores to form single measures of originality and flexibility for each participant, which reflected the quality of ideas explored. They assessed fluency—the sheer number of ideas explored—by counting the number of ideas explored (e.g., De Dreu, Baas, & Nijstad, 2008), achieving 100% agreement.

Manipulation checks. To ensure that our manipulations were effective in inducing three different levels of procrastination, we tracked how long each participant spent watching the funny videos on the task page. This measure captures how long participants chose to delay making progress on a task that needed to be completed. In addition, to ensure that participants perceived watching the funny videos as procrastinating, we asked them to complete four procrastination items adapted from Mann's (1982) decisional procrastination scale, anchored at 1 (*strongly disagree*) and 7 (*strongly agree*), focusing on the

extent to which they procrastinated in the business idea task, put off the business idea task, asked themselves if they should be working on the task, and spent much of the given time doing something else (α = .85). To confirm that they had the opportunity to be creative, drawing on measures of creative requirements and goals (Gong, Wu, Song, & Zhang, 2017; Shalley, 1995; Unsworth et al., 2005), we asked them about the extent to which they considered being creative an important goal and tried to be creative (α = .78). To verify that intrinsic motivation was not low, we asked the participants how interesting and enjoyable they found the business idea task (Grant, 2008; α = .90). Finally, to address the possibility that low or moderate procrastination could yield a sense of progress and thereby prevent negative affect or promote positive affect (Amabile, Barsade, Mueller, & Staw, 2005; see also De Dreu et al., 2008), we asked participants to complete the Discrete Emotions Questionnaire (Harmon-Jones, Bastian, & Harmon-Jones, 2016). We measured activated positive affect with the happiness scale (α = .94), deactivated positive affect with the relaxation scale (α = .94), deactivated negative affect with the sadness scale (α = .84), and activated negative affect with the anxiety scale (α = .90).

STUDY 1: RESULTS AND DISCUSSION

Table 1 displays means and standard deviations by condition, and Table 2 shows them across conditions along with correlations. In support of the validity of the procrastination manipulations, an ANOVA showed a significant effect of the procrastination manipulation on the video watching times, $F(2, 113) = 54.34$, $p < .001$, partial $\eta^2 = .49$. A planned contrast indicated that there was a significant linear trend across conditions, $t(2, 113) = 10.27$, $p < .001$, $d = 1.93$. Pairwise comparisons showed that participants in the moderate procrastination condition spent significantly more time watching videos ($M = 468.60$ seconds, $SD = 263.60$) than participants in the low procrastination condition ($M = 53.30$ seconds, $SD = 125.34$), $t(55.78) = 9.00$, $p < .001$, $d = 2.41$, and participants in the high procrastination condition spent significantly more time watching videos ($M = 720.75$ seconds, $SD = 404.31$) than the participants in the moderate procrastination condition, $t(59.14) = 3.18$, $p < .01$, $d = .83$. Thus, the manipulations led participants in the high procrastination condition to delay the progress in the task longer than participants in the moderate procrastination condition, who in turn delayed the progress in

TABLE 1:
Study 1: Means and Standard Deviations

Procrastination	Creativity	Idea originality	Idea flexibility	Idea fluency	Seconds watching videos	Self-reported procrastination	Intrinsic motivation	Creative requirement	Happiness	Relaxation	Sadness	Anxiety
Low ($n = 40$)	3.21 (1.86)	2.60 (0.96)	5.39 (2.22)	7.74 (3.01)	53.30 (125.34)	3.16 (1.56)	4.44 (1.80)	5.60 (1.28)	2.90 (1.54)	3.57 (1.74)	1.34 (0.58)	2.53 (1.37)
Moderate ($n = 40$)	4.48 (1.58)	3.17 (1.19)	6.21 (2.04)	8.38 (2.57)	468.60 (263.60)	3.79 (1.57)	4.51 (1.47)	5.65 (0.91)	2.54 (1.35)	3.60 (1.63)	1.37 (0.84)	2.60 (1.49)
High ($n = 39$)	3.36 (1.49)	2.65 (0.93)	5.01 (2.31)	7.66 (2.85)	720.75 (404.31)	4.53 (1.67)	4.41 (1.82)	5.54 (0.92)	2.37 (1.36)	3.50 (1.72)	1.42 (1.15)	2.49 (1.44)

Note: Standard deviations are in parentheses.

TABLE 2
Study 1: Means, Standard Deviations, and Correlations Across Conditions

Variables	Mean	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Creativity	3.68	1.73	(.95)												
2. Procrastination condition (0 = low, 1 = moderate, 0 = high)	.34	.82	.33***												
3. Originality	2.81	1.06	.69***	.25**	(.97)										
4. Flexibility	5.55	2.23	.27**	.22*	.30***	(.92)									
5. Fluency	7.93	2.81	.05	.12	−.02	.75***	(1.00)								
6. Time spent watching videos	403.64	392.79	.05	.12	.08	.08	.17	—							
7. Self-reported procrastination	3.82	1.68	−.07	−.01	.05	−.03	−.12	.43***	(.85)						
8. Intrinsic motivation	4.45	1.69	.25**	.03	.13*	.04	.12	.04	−.06	(.90)					
9. Creative requirement	5.60	1.05	.16	.04	.23*	.09	−.02	.06	.09	.35***	(.78)				
10. Happiness	2.60	1.43	−.00	−.03	−.02	.03	.11	−.08	−.05	.54***	.20*	(.94)			
11. Relaxation	3.55	1.68	−.06	.02	.13	.09	.16	−.04	−.08	.34***	.19*	.50***	(.94)		
12. Sadness	1.38	.88	−.18	−.01	−.17	.02	.15	−.02	.10	−.27**	−.09	−.16	−.24**	(.84)	
13. Anxiety	2.54	1.42	−.05	.03	−.04	.02	−.02	.06	.18	−.12	.07	−.12	−.40***	.42***	(.90)

Note: Cronbach's alphas for scales appear across the diagonal in parentheses.
* $p < .05$
** $p < .01$
*** $p < .001$

the task longer than participants in the low procrastination condition. Further, they recognized this as procrastination: the conditions varied significantly in self-reported procrastination, $F(2, 116) = 7.33$, $p < .01$, partial $\eta^2 = .11$, which represented a linear trend, $t(116) = 3.83$, $p < .01$, $d = .71$.[1]

Further, intrinsic motivation for the task was above the midpoint of the scale ($M = 4.45$) and creative requirement was higher ($M = 5.60$); neither varied significantly across conditions. There were also no significant differences by condition in happiness, relaxation, sadness, or anxiety. Taken together, these results establish that our manipulation succeeded in varying procrastination while holding intrinsic motivation and creative requirement constant between conditions.

Creativity Effects

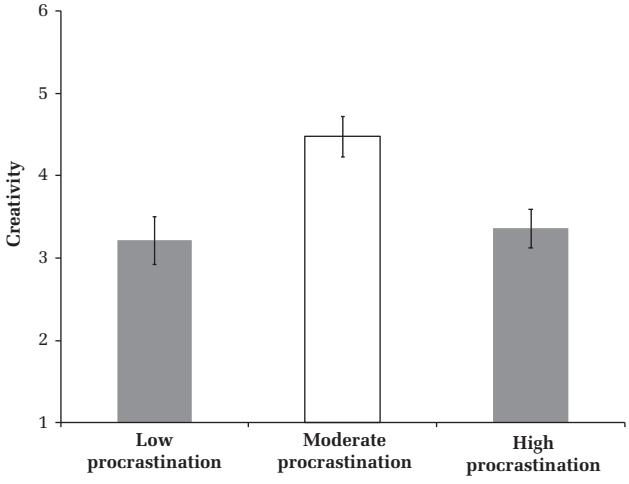
An ANOVA showed a significant effect of procrastination on the creativity of the business proposals, $F(2, 116) = 6.96$, $p < .01$, partial $\eta^2 = .11$. A planned contrast indicated that there was a significant curvilinear trend across conditions: participants in the moderate procrastination condition wrote significantly more creative proposals than those in the low and high procrastination conditions, $t(116) = 3.71$, $p < .001$, $d = .69$. Pairwise comparisons showed that participants in the moderate procrastination condition ($M = 4.48$, $SD = 1.58$) wrote significantly more creative proposals than participants in the low procrastination condition ($M = 3.21$, $SD = 1.86$), $t(78) = 3.27$, $p < .01$, $d = .74$ and the high procrastination condition ($M = 3.36$, $SD = 1.49$), $t(77) = 3.22$, $p < .01$, $d = .73$. Creativity did not differ significantly between the low and high procrastination conditions (see Figure 1). These results provide support for Hypothesis 1.

Exploratory Analyses

To gauge whether the creativity effects were a function of quality or quantity, we analyzed the coders'

[1] Pairwise comparisons showed a trend for participants in the moderate procrastination condition to report procrastinating more ($M = 3.79$, $SD = 1.57$) than participants in the low procrastination condition ($M = 3.16$, $SD = 1.56$), $t(78) = 1.81$, $p < .10$, $d = .41$, and participants in the high procrastination condition reported that they procrastinated significantly more ($M = 4.53$, $SD = 1.67$) than the participants in the moderate procrastination condition, $t(77) = 2.04$, $p < .05$, $d = .46$.

FIGURE 1
Study 1: Creativity Effects



ratings of ideas explored during brainstorming on originality, flexibility, and fluency. It is important to note that we do not view these dimensions of ideas as potential mediators as they are not the psychological processes that transmit the effects of procrastination on creativity—they are behavioral outcomes of those processes. Our objective in conducting these analyses is to gain a more precise understanding of how procrastination influences creative output.

There were no significant differences by condition in fluency, indicating that the quantity of ideas was not affected by procrastination. However, there were significant differences by condition in originality, $F(2, 113) = 3.67$, $p < .05$, partial $\eta^2 = .06$. Planned contrasts showed that participants in the moderate procrastination condition generated significantly more original ideas than those in the low and high procrastination conditions, $t(65.40) = 2.52$, $p = .01$, $d = .62$.[2] There were also significant differences by condition in flexibility, $F(2, 113) = 3.06$, $p = .05$, partial $\eta^2 = .05$. Planned contrasts showed that participants in the moderate procrastination condition had significantly higher flexibility than those in the low and high procrastination conditions, $t(113) = 2.36$, $p < .05$, $d = .44$.[3]

Regression analyses showed that after controlling for originality and flexibility, the curvilinear effect of procrastination on creativity decreased from $b = -1.21$, $SE = .33$, $\beta = .33$, $t = -3.73$, $p < .001$ to $b = -.61$, $SE = .26$, $\beta = -.58$, $t = -2.35$, $p < .05$, and creativity was significantly predicted by originality, $b = 1.04$, $SE = .12$, $\beta = .63$, $t = 8.75$, $p < .001$.[4] To examine the size and significance of the indirect effect, we employed the bootstrap procedures recommended by Hayes and Preacher (2010). We constructed bias-corrected confidence intervals based on 1,000 random samples with replacement from the full sample. The indirect curvilinear effect of procrastination on creativity through originality was significant ($\theta = -.56$, 95% CI $= -1.04, -.13$). More specifically, the instantaneous indirect effect through originality was significant and positive at low procrastination ($\theta = .97$, 95% CI $= .25, 1.77$), nonsignificant at moderate procrastination ($\theta = .03$, 95% CI $= -.21, .24$), and significant and negative at high procrastination ($\theta = -.91$, 95% CI $= -1.77, -.17$). Together, these results suggest that the heightened creativity under moderate procrastination was driven by the quality of ideas explored, not the quantity.

One alternative explanation for our results is that participants may have incorporated the material from the procrastination videos in their idea generation efforts. When we asked participants how they came up with their ideas and where the ideas came from, 16% of participants mentioned that watching the videos influenced their business ideas. Examples include a social media app that would require a waiting period for mean tweets to be posted so people had a chance to change their minds, an app that would filter out mean online comments, a music business making the mean tweets into songs, a television series with celebrities doing some of the things people tweeted about them, and a company where

[2] Pairwise comparisons showed that participants in the moderate procrastination condition generated significantly more original ideas ($M = 3.17$, $SD = 1.19$) than participants in the low procrastination condition ($M = 2.60$, $SD = .96$), $t(74.11) = 2.35$, $p < .05$, $d = .55$ and the high procrastination condition ($M = 2.65$, $SD = .93$), $t(73.30) = 2.15$, $p < .05$, $d = .50$. The originality of ideas did not differ between the low procrastination condition and the high procrastination condition.

[3] Pairwise comparisons showed that participants in the moderate procrastination condition demonstrated significantly greater flexibility than the high procrastination condition ($M = 5.01$, $SD = 2.31$), $t(76) = 2.43$, $p < .05$, $d = .56$ but not significantly greater flexibility ($M = 6.21$, $SD = 2.04$) than participants in the low procrastination condition ($M = 5.39$, $SD = 2.22$), $t(76) = 1.70$, $p < .10$, $d = .39$. Flexibility did not differ between the low procrastination condition and the high procrastination condition.

[4] When we entered flexibility separately, it was a significant predictor of creativity, but once we added originality, flexibility dropped below significance.

people could pay to talk with celebrities. However, the rate of being influenced by watching the videos did not vary significantly by condition (low procrastination: 15%; moderate procrastination: 15%; high procrastination: 18%), $\chi^2 = .17$, $p = .92$. Further, incorporating the video content was actually negatively correlated with creativity, $r = -.20$, $p < .04$, and the effects of our manipulations on creativity were unchanged when we controlled for whether participants incorporated the video content into their business proposals.

Altogether, although these results are intriguing, they are subject to several limitations. First, it remains to be seen whether the effects can be replicated in different samples with different creativity tasks. Second, although we attempted to hold the number of funny videos constant between the low and moderate conditions by allowing participants in the low procrastination condition to watch four videos before starting the task, since the other two conditions did not have access to funny videos prior to the task introduction, it represents a potential confound. Third, we were unable to examine the incubation processes that mediate the curvilinear effect of procrastination.

To address these limitations, we conducted a second experiment. We recruited a new sample of graduate rather than undergraduate students and randomly assigned them to different levels of procrastination by making different numbers of funny YouTube videos easily accessible without allowing any conditions to watch them first. The creativity task was to generate a creative idea for how student entrepreneurs can earn money. We measured the hypothesized incubation mechanisms by coding the set of ideas that participants explored during the brainstorming phase before writing their final proposals for problem restructuring and the activation of new knowledge.

STUDY 2: METHOD

Sample, Design, and Procedures

We conducted a laboratory experiment in the behavioral lab of a large U.S. university. The participants were 126 graduate students, 58% female, with an average age of 25.34 ($SD = 4.50$). We paid them $12 for an hour of their time. We randomly assigned each experimental session to one of three conditions (low procrastination, moderate procrastination, high procrastination).

The task was to help a student named Mike with an assignment for an entrepreneurship class. The assignment, based on an actual creativity task used in a technology ventures class at Stanford (Seelig, 2009), was to generate as much money as possible in three hours, and the students were given $10 in seed money to start. For example, they could use the money to buy lemons, sugar, and cups and then sell lemonade. In the next class, Mike would have five minutes to present his results and the lessons learned. In the brainstorming phase, we asked the participants to write down all the ideas that came to mind in the space provided, which allowed us to assess the extent of problem restructuring and the activation of new knowledge during brainstorming. Then, we asked the participants to choose their most creative idea and write an email to Mike explaining the idea in detail, which allowed us to assess the creativity of the final proposal.

Procrastination manipulation. We used the same procrastination manipulation as in Study 1 but did not have participants in the low procrastination condition watch videos first. To prevent demand characteristics, we added a cover story: since failure and rejection are common in entrepreneurship, to remind students that everyone faces obstacles, Mike's professor showed mean tweets videos in class. To give the participants a taste of Mike's class, sample videos were embedded on the page with the task instructions. In the low procrastination condition, one funny video was embedded on the task page, and a link at the bottom took them to a page with eight more. In the moderate procrastination condition, four videos were embedded on the task page, and the link at the bottom directed them to a page with five more. In the high procrastination condition, eight videos were embedded on the task page, and the link at the bottom pointed to a page with one more. All participants had 30 minutes for the task.

Creativity Measure

Two trained research assistants coded participants' proposals for creativity on a 7-point Likert-type scale anchored at 1 (*not at all creative*), 4 (*somewhat creative*), and 7 (*very creative*) (Goncalo & Staw, 2006; Grant & Berry, 2011). Once again, they were graduate students in a business school and were unaware of the purpose of the study, the hypotheses, and the experimental conditions. We provided them with the task directions and the emails to Mike in an Excel file stripped of all identifying information. Since the two raters achieved good reliability (ICC2 = .85, $p < .001$) and agreement (average deviation = .31), we averaged the two raters' scores to form a single creativity

score for each participant. For example, an email about setting up a photo shoot booth was deemed very creative and an email about setting up a lemonade stand was deemed not at all creative.

Incubation Mediators

We recruited two separate coders to evaluate the extent of the problem restructuring and the activation of new knowledge during the brainstorming phase.

Problem restructuring. The initial framing of the main problem was to use the $10 seed funding to earn more money. In actual classes, that often leads students to set up lemonade stands or buy lottery tickets (Seelig, 2009). Yet highly creative students have reframed the problem by relaxing the constraint of investing the seed money and asking how to generate the highest revenue regardless of whether the funding is used. For example, one team made restaurant reservations at popular restaurants on Saturday night and earned several hundred dollars selling them, and another filled bicycle tires and collected donations from grateful cyclists. The most successful team realized their most valuable resource was not the money or the time to earn more, but the few minutes they had in front of their classmates, which they sold for $650 to a company that paid them to make a recruiting commercial (Seelig, 2009).

To measure problem restructuring, in line with prior research (Knoblich, Ohlsson, Haider & Rhenius, 1999; MacGregor, Ormerod, & Chronicle, 2001), the two coders evaluated the extent to which participants were wedded to the initial framing of the problem as investing the $10 or restructured the problem as earning as much money as possible regardless of the seed funding. The coders counted the number of times that each participant restructured the problem as a total percentage of their ideas explored during brainstorming, achieving high reliability (ICC2 = .94, $p <$ .001) and agreement (AD = .02), and we averaged their scores.

Activation of new knowledge. To assess the total amount of new knowledge activated during brainstorming (Bowers, Regehr, Balthazard, & Parker, 1990), the coders rated the extent to which each idea explored during brainstorming contained new knowledge compared to the participants' earlier ideas on a scale of one to seven and summed their ratings. As an example of low activation of new knowledge, a participant proposed one idea of singing or playing an instrument to earn tips on a busy street and another idea of paying a real musician a portion of their earnings to perform on a busy street; these two ideas draw upon the same knowledge. As an example of high activation of new knowledge, a participant proposed one idea of buying nail polish and charging people to have their nails painted and another idea of buying different Kool-Aid flavors and charging people for a taste test with a chance to win money; these two ideas draw on different knowledge. The coders achieved high reliability (ICC2 = .95, $p <$ .001) and agreement (AD = .49), and we averaged their scores.

Manipulation Checks

We once again measured how long each participant spent watching the funny videos on the task page and asked them to complete procrastination items adapted from Mann's decisional procrastination scale (1982; α = .69). To gain insight into when participants started making progress on the task, we also measured the time at which they entered their first idea during brainstorming.

STUDY 2: RESULTS AND DISCUSSION

Table 3 displays means and standard deviations by condition, and Table 4 shows them across conditions along with correlations. In support of the validity of the procrastination manipulations, an ANOVA showed a significant effect of the procrastination manipulation on the video watching times, $F(2, 121) = 77.62$, $p < .001$, partial $\eta^2 = .56$. A planned contrast indicated that there was a significant linear trend across conditions, $t(2, 121) = 12.41$, $p < .001$, $d = 2.26$. Pairwise comparisons showed that participants in the moderate procrastination condition spent significantly more time watching videos (M = 441.52 seconds, SD = 198.46) than participants in the low procrastination condition (M = 70.10 seconds, SD = 34.85), $t(43.53) = 11.95$, $p < .001$, $d = 3.62$, and participants in the high procrastination condition spent significantly more time watching videos (M = 727.90 seconds, SD = 368.65) than the participants in the moderate procrastination condition, $t(59.21) = 4.35$, $p < .001$, $d = 1.13$. Thus, the manipulations led participants in the high procrastination condition to delay the progress in the task longer than participants in the moderate procrastination condition, who in turn delayed the progress in the task longer than participants in the low procrastination condition. Once again, they recognized this as procrastination: the conditions varied significantly in self-reported procrastination, $F(2, 123) = 6.71$, $p < .01$, partial

TABLE 3
Study 2: Means and Standard Deviations

Procrastination	Creativity	Problem restructuring	Activation of new knowledge	Seconds watching videos	Self-reported procrastination	Seconds before submitting first idea
Low (n = 42)	2.42 (1.48)	.20 (.17)	28.69 (12.74)	70.09 (34.85)	3.23 (1.22)	178.37 (64.72)
Moderate (n = 42)	3.21 (1.80)	.30 (.16)	33.57 (8.67)	441.52 (198.46)	3.88 (1.74)	298.88 (165.68)
High (n = 42)	2.06 (1.53)	.22 (.20)	24.46 (10.32)	727.90 (368.65)	4.54 (1.88)	457.38 (396.95)

Note: Standard deviations are in parentheses.

TABLE 4:
Study 2: Means, Standard Deviations, and Correlations Across Conditions

Variables	Mean	*SD*	1	2	3	4	5	6
1. Creativity	2.56	1.67	(.85)					
2. Procrastination condition (0 = low, 1 = moderate, 0 = high)	.33	.47	.28**	—				
3. Problem restructuring	.24	.18	.29**	.24**	(.94)			
4. Activation of new knowledge	28.91	11.26	.29**	.29**	.33***	(.95)		
5. Time spent watching videos	408.10	359.55	−.18*	.07	−.04	−.21*	—	
6. Self-reported procrastination	3.88	1.71	−.15	.00	−.01	−.20*	.54***	(.69)
7. Time before submitting first idea	310.25	271.95	−.12	−.03	−.23*	.08	.49***	.36***

Note: Cronbach's alphas for scales appear across the diagonal in parentheses.
* $p < .05$
** $p < .01$
*** $p < .001$

$\eta^2 = .09$, which represented a linear trend, $t(123) = 3.66$, $p < .001$, $d = .66$.[5]

Turning to the time when participants began submitting ideas, the conditions varied significantly in how long they waited to enter their first idea, $F(2, 123) = 12.78$, $p < .001$, partial $\eta^2 = .18$, which represented a linear trend, $t(123) = 5.04$, $p < .001$, $d = .91$. Pairwise comparisons showed that participants in the low procrastination condition submitted their first idea earlier ($M = 178.37$, $SD = 64.72$) than those in the moderate procrastination condition ($M = 298.88$, $SD = 165.68$), $t(53.48) = 4.38$, $p < .001$, $d = 1.20$, who in turn submitted theirs earlier than those in the high procrastination condition ($M = 457.38$, $SD = 396.95$), $t(51.66) = 2.34$, $p < .05$, $d = .65$.[6]

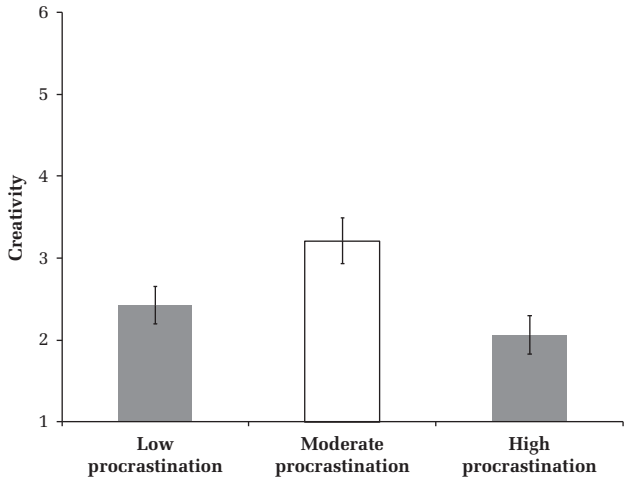
Creativity Effects

An ANOVA showed a significant effect of procrastination on the creativity of the final proposals, $F(2, 123) = 5.66$, $p < .01$, partial $\eta^2 = .08$. A planned contrast indicated that there was a significant curvilinear trend across conditions: participants in the moderate procrastination condition wrote significantly more creative proposals than those in the low and high procrastination conditions, $t(123) = 3.21$, $p < .01$,

[5] Pairwise comparisons showed that participants in the moderate procrastination condition reported that they procrastinated more ($M = 3.88$, $SD = 1.74$) than participants in the low procrastination condition ($M = 3.23$, $SD = 1.22$), $t(73.53) = 2.00$, $p < .05$, $d = .47$, and there was a trend for participants in the high procrastination condition to report procrastinating more ($M = 4.54$, $SD = 1.88$) than the participants in the moderate procrastination condition, $t(81.50) = 1.66$, $p = .10$, $d = .37$.

[6] Once again, we examined whether participants used the content from the procrastination videos in their idea generation efforts. In this experiment, the videos were less relevant to the creative task: participants were tasked not with dreaming up an online business but with generating ideas to make money in a short period of time. Out of 126 participants, only three participants wrote that their idea came from watching the videos, ruling out this alternative explanation.

FIGURE 2
Study 2: Creativity Effects



d = .58. Pairwise comparisons showed that participants in the moderate procrastination condition (M = 3.21, SD = 1.80) wrote significantly more creative proposals than participants in the low procrastination condition (M = 2.42, SD = 1.48), $t(79) = 2.22$, $p < .05$, d = .50 and the high procrastination condition (M = 2.06, SD = 1.53), $t(80) = 3.17$, $p < .01$, d = .71. Creativity did not differ significantly between the low and high procrastination conditions (see Figure 2). These results provide support for Hypothesis 1.

Mediating Mechanisms

There were significant differences by condition in problem restructuring, $F(2, 123) = 3.99$, $p < .05$, partial η^2 = .06. Planned contrasts showed that participants in the moderate procrastination condition showed significantly higher problem restructuring than those in the low and high procrastination conditions, $t(123) = 2.77$, $p < .01$, d = .50. Pairwise comparisons showed that participants in the moderate procrastination condition demonstrated significantly higher problem restructuring (M = .30, SD = .16) than participants in the low procrastination condition (M = .20, SD = .17), $t(82) = 2.87$, $p < .01$, d = .63 and significantly higher problem restructuring than participants in the high procrastination condition (M = .22, SD = .20), $t(82) = 2.08$, $p < .05$, d = .46. Problem restructuring did not differ significantly between the low procrastination condition and the high procrastination condition.

There were also significant differences by condition in the activation of new knowledge, $F(2, 123) = 7.60$, $p < .01$, partial η^2 = .11. Planned contrasts showed that participants in the moderate procrastination condition showed significantly higher activation of new knowledge than those in the low and high procrastination conditions, $t(123) = 3.46$, $p < .01$, d = .62. Pairwise comparisons showed that participants in the moderate procrastination condition showed significantly higher activation of new knowledge (M = 33.57, SD = 8.67) than participants in the low procrastination condition (M = 28.69, SD = 12.74), $t(72.26) = 2.05$, $p < .05$, d = .48 and significantly higher activation of new knowledge than participants in the high procrastination condition (M = 24.46, SD = 10.32), $t(82) = 4.38$, $p < .001$, d = .97. Activation of new knowledge did not differ significantly between the low procrastination condition and the high procrastination condition.

In regression analyses, after controlling for problem restructuring and the activation of new knowledge, the curvilinear effect of procrastination on creativity decreased from $b = -.98$, SE = .30, $\beta = -1.00$, $t = -3.21$, $p < .001$ to $b = -.64$, SE = .31, $\beta = -.65$, $t = -2.05$, $p < .05$, and creativity was significantly predicted by both problem restructuring, b = 1.83, SE = .84, β = .20, t = 2.18, $p < .05$, and activation of new knowledge, b = .03, SE = .02, β = .21, t = 2.09, $p < .05$. To assess the size and significance of the indirect effects, we followed the bootstrap procedures recommended by Hayes and Preacher (2010), constructing bias-corrected confidence intervals based on 1,000 random samples with replacement from the full sample. The indirect curvilinear effect of procrastination on creativity through problem restructuring was significant ($\theta = -.16$, 95% CI = $-.38$, $-.01$). More specifically, the instantaneous indirect effect through problem restructuring was significant and positive at low procrastination (θ = .36, 95% CI = .12, .88), nonsignificant at moderate procrastination (θ = .02, 95% CI = $-.06$, .12), and significant and negative at high procrastination ($\theta = -.31$, 95% CI = $-.83$, $-.08$).The indirect curvilinear effect of procrastination on creativity through the activation of new knowledge was also significant ($\theta = -.21$, 95% CI = $-.44$, $-.05$). More specifically, the instantaneous indirect effect through the activation of new knowledge was significant and positive at low procrastination (θ = .31, 95% CI = .08, .75), nonsignificant at moderate procrastination ($\theta = -.07$, 95% CI = $-.22$, $-.00$), and significant and negative at high procrastination ($\theta = -.45$, 95% CI = $-.92$, $-.16$). From low to moderate procrastination, additional procrastination increased creativity through facilitating problem restructuring and the activation of new knowledge; from moderate to high

levels of procrastination, additional procrastination reduced creativity through hindering problem restructuring and the activation of new knowledge.

These results support Hypotheses 2a and 2b, indicating that problem restructuring and the activation of new knowledge partially mediated the curvilinear effect of procrastination on creativity. However, they raise several important questions. First, just because an effect can be demonstrated in the laboratory does not mean it will stand in the field. It remains to be seen whether any benefits of moderate procrastination are outweighed by the greater number of distractions in organizational settings and whether the same creativity effects emerge when procrastination is naturally occurring rather than experimentally manipulated. Second, it is also unclear whether the curvilinear effect will hold in other cultures. Third, in both of our experiments, to isolate the effects of procrastination, we held the task constant, making it impossible to examine boundary conditions.

We addressed these limitations in a field study. To examine whether the curvilinear relationship is unique to the United States, we gathered data from a Korean sample of employees, surveying them on their procrastination levels and their supervisors on their creativity. To capture natural variance in intrinsic motivation and the opportunity to be creative, we included employees from a range of departments in the company.

STUDY 3: METHOD

Sample and Procedures

We collected data from 170 employees and their direct supervisors at a furniture company in South Korea. Interviews with managers suggested that there was natural variance in the key constructs of procrastination and creativity. This furniture company engaged in various aspects of making and selling furniture, with different kinds of deadlines and opportunities to generate novel and useful solutions to problems. Although there may have been few instances of revolutionary ("Big-C") creativity, it was an appropriate setting in which to examine everyday ("little-c") creativity (Simonton, 2013).

The company had many diverse departments such as strategy, sales, design, marketing, quality management, production management, and customer service. The final sample included employees from each of these departments, all of whom had a "nine-to-five" job in an office environment. We distributed the questionnaire to 250 employees from a representative cross section of office jobs in the organization, asking them to participate in a confidential academic study about work motivation and job satisfaction. A total of 177 employees completed the surveys, yielding a response rate of 71%. In the survey, employees were asked to indicate how much they procrastinated at work. Each employee's direct supervisor was asked to rate the creativity of the focal employee, and we received supervisor responses for 170 employees. The employees were 56% male, averaged 31 years of age, and averaged 3.63 years in their current job. There were 27 supervisors, resulting in an average of just over six employees per supervisor.

Measures

Unless otherwise indicated, all items used a 7-point Likert-type scale anchored at 1 (*strongly disagree*) and 7 (*strongly agree*).

Procrastination. Consistent with the personal project methodology for assessing procrastination (Blunt & Pychyl, 2000, 2005; Lay, 1986; Pychyl & Little, 1998), employees reported the extent to which they procrastinated in each of their core tasks. Employees first wrote down their core tasks in their jobs[7] and subsequently indicated how much they procrastinated in each task on a 7-point Likert-type scale anchored at 1 (*not at all*) and 7 (*to a great extent*). We averaged the procrastination scores for each task to form a global measure of procrastination at work for each employee ($\alpha = .78$).

Creativity. To measure creativity, supervisors rated each employee using the nine-item scale developed by Tierney, Farmer, and Graen (1999), including "Generated novel, but operable work-related ideas" and "Served as a good role model for creativity" ($\alpha = .96$).

Task efficiency. To test whether the results were unique to creativity, we also measured task efficiency. For each task, supervisors rated the quantitative aspect of performance using an item adapted from Ashford and Black (1996): "This employee achieves high quantity of work output in this task" ($\alpha = .83$).

Intrinsic motivation. To measure intrinsic motivation at the job level, we used the scale from Grant (2008), which opens by asking employees why they are motivated to do their work and consists of four

[7] Employees wrote down up to five core tasks. We identified five as an appropriate number of core tasks after discussions with the human resources manager. This is also consistent with the average number of core tasks for clerical jobs in previous research (Little, Salmela-Aro, & Phillips, 2007; Taber & Alliger, 1995; Wong & Campion, 1991).

TABLE 5
Study 3: Means, Standard Deviations, and Correlations at the Job Level

Variables	Mean	*SD*	1	2	3	4	5	6	7	8	9
1. Creativity	4.07	.94	(.96)								
2. Procrastination	2.61	1.07	−.09	(.78)							
3. Intrinsic motivation	4.02	1.39	.19*	−.08	(.94)						
4. Creative requirement	4.40	1.42	.17*	−.14	.51***	(.86)					
5. Task efficiency	4.59	.93	.56***	−.08	.03	.02	(.83)				
6. Extrinsic motivation	4.76	1.30	−.10	−.07	−.27**	−.20**	−.10	(.84)			
7. Age	31.22	4.47	.22**	−.01	.09	.18*	.24**	.05			
8. Gender (Male = 1, Female = 2)	1.36	.48	−.22**	−.01	−.14	−.17*	−.11	−.12	−.52***		
9. Education	3.03	.21	.06	−.06	.20*	.14	−.02	−.11	.11	−.18*	
10. Job experience (in months)	43.54	39.50	.13	.00	.05	.09	.20*	.05	.67***	−.11	−.02

Note: Cronbach's alphas for scales appear across the diagonal in parentheses.
* $p < .05$
** $p < .01$
*** $p < .001$

items: "Because I enjoy the work itself," "Because it is fun," "Because I find the work engaging," and "Because I enjoy it" ($\alpha = .94$).

Creative requirement. To measure creative requirement, employees completed a scale developed by Morgeson and Humphrey (2006). The items were "My job involves solving problems that have no obvious correct answer," "My job requires me to be creative," "My job often involves dealing with problems I have not met before," and "My job requires unique ideas or solutions to problems" ($\alpha = .86$).

Control variables. Because extrinsic motivation can also affect creativity (Amabile, 1993), we controlled for employees' extrinsic motivation using the items from Grant and Berry (2011): "Because I need to earn money," Because I need to pay my bills," "Because I need the income," and "Because I need to support myself and my family" ($\alpha = .84$). We also controlled for age, gender, education, and job experience, as these factors may influence creativity (Amabile, 1988; Tierney & Farmer, 2002). Education was coded as 1, "middle school"; 2, "high school"; 3, "college"; and 4 "graduate school," while job experience was measured by the number of months in the current job.

STUDY 3: RESULTS AND DISCUSSION

Means, standard deviations, and correlations for the study variables appear in Table 5. Of the variance in creativity, 80% was at the employee level and 20% was at the supervisor level. To assess nonresponse bias, we compared respondents and nonrespondents on the demographic variables of age, gender, and education (Rogelberg & Stanton, 2007). There were no significant differences on any of these variables. Prior to our analysis, we standardized our predictor variables, which include procrastination, intrinsic motivation, creative requirement, extrinsic motivation, age, gender, education, and job experience. We accounted for the nested nature of our data by conducting random coefficient modeling. In Table 6, the third column (Step 3) shows a regression model with procrastination squared and procrastination, as well as the control variables predicting creativity. The results show that procrastination has an inverted-U-shaped relationship with creativity ($\gamma = -.12$, $p < .05$), such that creativity is highest at the middle ranges of procrastination (see Figure 3). At low to moderate procrastination, each additional unit of procrastination increases creativity; at moderate to high levels of procrastination, each additional unit of procrastination reduces creativity. Thus, as one moves away from either side of extremely low and high procrastination toward moderate procrastination, creativity is heightened.

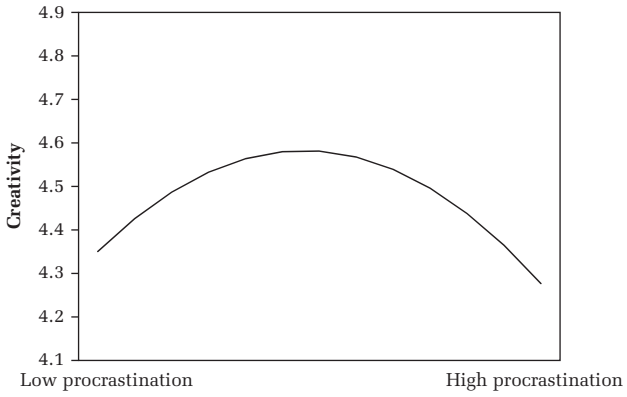
A significant quadratic effect is necessary but not sufficient for establishing an inverted-U-shaped relationship; the slopes need to be significantly positive on the left side of the curve and significantly negative on the right side of the curve, and the turning point needs to occur within the range of the data (Haans, Pieters, & He, 2016). These conditions can be examined with the two-lines test (Simonsohn, 2018). The relationship between procrastination and creativity was significant and positive for low to moderate values of procrastination ($\gamma = .42$, $p < .05$) and

TABLE 6
Study 3: Coefficient Estimates

Variables	DV: Creativity															DV: Efficiency					
	Step 1: Control variables			Step 2: Adding procrastination			Step 3: Curvilinear effect of procrastination			Step 4: Two-way interaction effects			Step 5: Quadratic three-way interaction effect			Step 1: Linear effect			Step 2: Including all interactions		
	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*	γ	*SE*	*t*
Intercept	4.17	.11	37.54***	4.18	.11	37.17***	4.29	.12	36.09***	4.29	.12	37.05***	4.38	.12	36.80***	4.61	.14	33.89***	4.59	.14	31.80***
Intrinsic motivation	.08	.08	.94	.06	.08	.81	.08	.08	.96	.05	.10	.47	.06	.10	.61	−.06	.08	−.76	−.09	.08	−1.04
Creative requirement	.05	.08	.63	.04	.08	.49	.03	.08	.41	.16	.10	1.63	.17	.10	1.69†	.11	.08	1.42	.14	.09	1.59
Extrinsic motivation	.00	.07	−.07	−.02	.07	−.25	−.03	.07	−.49	−.05	.07	−.72	−.04	.07	−.64	.00	.06	−.03	.00	.06	.07
Age	.03	.11	.27	.03	.11	.32	−.01	.11	−.06	−.03	.11	−.25	−.06	.11	−.55	.08	.10	.82	.08	.10	.79
Gender	−.27	.09	−3.11**	−.27	.09	−3.19**	−.31	.09	−3.58***	−.33	.08	−3.87***	−.34	.08	−4.03***	−.14	.08	−1.73†	−.13	.08	−1.68†
Education	.00	.07	.06	.01	.07	.08	−.02	.07	−.31	−.04	.07	−.59	−.03	.07	−.49	−.03	.06	−.47	−.03	.06	−.44
Job experience	.05	.10	.53	.05	.10	.55	.09	.10	.99	.12	.10	1.23	.16	.10	1.65†	.11	.09	1.28	.11	.09	1.22
Procrastination				−.10	.06	−1.61	−.02	.07	−.35	−.03	.08	−.41	−.01	.08	−.15	−.13	.04	−3.39**	−.16	.05	−3.12**
Procrastination^2							−.12	.05	−2.31*	−.14	.05	−2.66**	−.23	.07	−3.46***				.04	.04	1.09
Procrastination × Intrinsic motivation										.10	.08	1.23	.13	.08	1.68†				−.08	.05	−1.54
Procrastination × Creative requirement										.04	.08	.50	.00	.08	.06				.05	.05	.98
Creative requirement × Intrinsic motivation										.02	.06	.38	−.11	.08	−1.27				−.02	.07	−.34
Procrastination × Intrinsic motivation × Creative requirement										−.01	.05	−.13	−.02	.05	-.40				.01	.04	.19
Procrastination^2 × Intrinsic motivation										.03	.06	.49	.03	.06	.56				.04	.03	1.15
Procrastination^2 × Creative requirement										−.12	.06	−1.82†	−.11	.06	−1.83†				−.04	.04	−.89
Procrastination^2 × Intrinsic motivation × Creative requirement													.10	.05	2.16*				−.01	.03	−.40
R^2		.10			.10			.16			.21			.23			.02			.02	
f^2		.11			.11			.19			.26			.30			.02			.02	

Notes: All predictors are standardized.
† $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

FIGURE 3
Study 3: Curvilinear Relationship



significant and negative for moderate to high values of procrastination ($\gamma = -.26$, $p < .05$). Because the slopes are determined from the data in the two-lines test, the turning point is within the range of the data. Taken together, these results provide support for Hypothesis 1.

To test Hypothesis 3, we constructed two additional models. Step 4 in Table 6 shows the linear and quadratic two-way interactions, and Step 5 shows a quadratic three-way interaction with procrastination squared, creative requirement, and intrinsic motivation. The quadratic three-way interaction is significant ($\gamma = .10$, $SE = .05$, $t = 2.16$, $p < .05$), such that procrastination has an inverted-U-shaped relationship when intrinsic motivation and/or creative requirement is high but a negative linear relationship when both intrinsic motivation and creative requirement are low (see Figure 4). The low–low slope is significantly linear ($\gamma = -.20$, $SE = .08$, $t = -2.42$, $p < .05$) but not significantly curvilinear ($\gamma = -.04$, $SE = .07$, $t = -.62$, $p > .05$). Meanwhile, the high–high curve is significantly curvilinear ($\gamma = -.21$, $SE = .08$, $t = -2.64$, $p < .01$), and it is not significantly different from the high creative requirement–low intrinsic motivation curve, $\chi 2\ (2) = 5.24$, $p > .05$, or the low creative requirement–high intrinsic motivation curve, $\chi 2\ (2) = .09$, $p > .05$, in curvilinearity. Overall, these results provide support for Hypothesis 3, suggesting that moderate procrastination is conducive to creativity as long as employees are intrinsically motivated or expected to be creative, but not when both of these conditions are missing.[8]

[8] The linear two-way and three-way interactions of procrastination with intrinsic motivation and creative requirement are not significant.

As expected, procrastination had a linear negative relationship with task efficiency ($\gamma = -.13$, $p < .01$) but did not have a curvilinear relationship with task efficiency. These results suggest that supervisors do not generally favor employees who neither rush into tasks nor procrastinate until the last minute: the benefits of moderate procrastination apply to creativity but not task efficiency.

GENERAL DISCUSSION

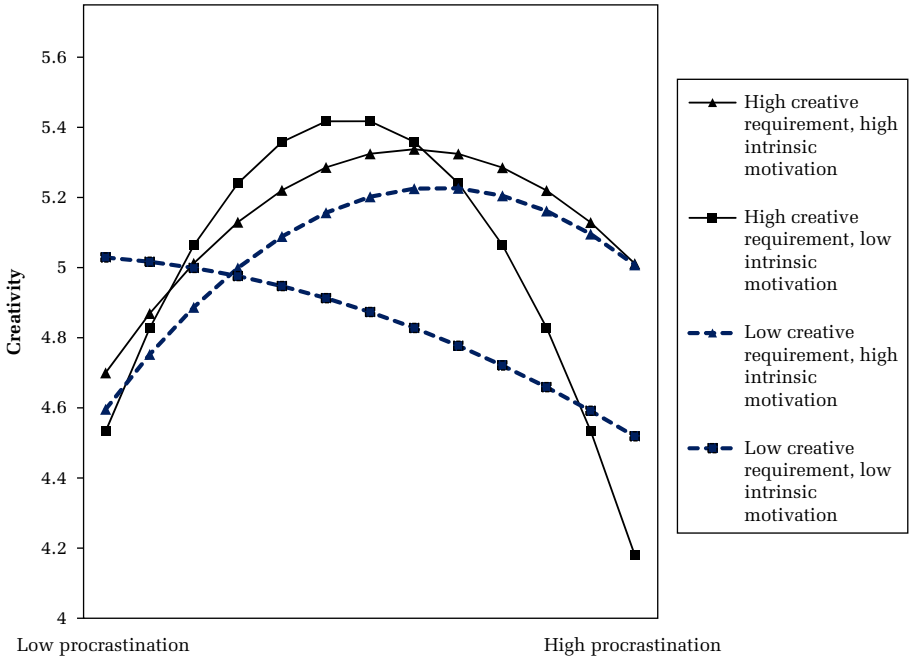
Our laboratory experiments demonstrated that moderate procrastination can causally influence the production of creative ideas through the incubation mechanisms of problem restructuring and activation of new knowledge. Our field study showed that when employees procrastinated moderately on their tasks, their supervisors gave them higher ratings of creativity as long as they had high intrinsic motivation or high creative requirements. This curvilinear relationship between procrastination and the quality of employees' ideas did not extend to the quantity of their work: supervisors rated them as exhibiting lower task efficiency on tasks where they procrastinated. These results have important implications for research on time management, creativity, and motivation.

Theoretical Contributions

Our research challenges the dominant view of procrastination as an inherently dysfunctional behavior. Although individuals may anticipate that delays can be costly, we find that moderate procrastination can allow for incubation and promote creativity—provided that individuals are intrinsically motivated or the task allows for the development of new ideas. In doing so, our work complicates traditional assumptions about time management. Existing studies of time management skill have emphasized that employees benefit from the capacity to prioritize tasks efficiently, use waiting time efficiently, and stick to deadlines (Macan, 1994; Rapp, Bachrach, & Rapp, 2013). Our research suggests that although these skills are paramount for efficiency, they are not always conducive to creativity. To develop ideas that are novel and useful, employees may need the skills to delay the start, progression, or completion of a task while being aware that there may be a downside to that action.

Our research also offers insight into the role of incubation in creativity. Existing studies have suggested that having an incubation period for ideas to

FIGURE 4
Study 3: Moderation by Intrinsic Motivation and Creative Requirement



germinate sometimes enhances creativity and sometimes does not (Ellwood, Pallier, Snyder, & Gallate, 2009; Sio & Ormerod, 2009). While moderate procrastination and high procrastination both entail incubation periods, we find that only moderate procrastination increases the creativity of the final outcome. Under moderate procrastination, when most of the progress occurs away from the task introduction and the task deadline, employees can continue restructuring the problem and activating new knowledge, which results in a creative outcome. On the other hand, under high procrastination, when most of the progress occurs near the task deadline, employees may feel the urge to finish the task as soon as possible, which hinders problem restructuring and activation of new knowledge, resulting in a less creative outcome. Our findings suggest that the timing of progress matters for effective incubation, thereby extending knowledge about curvilinear relationships (Grant & Schwartz, 2011; Pierce & Aguinis, 2013). It appears that moderate procrastination allows for effective incubation which lies between the deficiency of starting right away and the excess of rushing to meet a deadline.

Further, our investigation enriches knowledge about intrinsic motivation. Although the majority of research has conceptualized intrinsic motivation as an antidote to procrastination, existing empirical evidence has indicated that intrinsic motivation explains less than 10% of the variance in procrastination (Steel, 2007), and in our field study, the two variables were not significantly correlated. Our theoretical perspective and empirical findings suggest that intrinsic motivation does not necessarily prevent procrastination, but it may influence how employees direct their attention while procrastinating. This highlights a complementary role for intrinsic motivation in the creative process, underscoring the value of studying not only how intrinsic motivation affects behavior in focal tasks but also how it affects attention during off-task activities. Our research emphasizes that intrinsic motivation can operate as a moderator of behavior, not only as a cause of behavior. In addition, we find that when intrinsic motivation is absent, a creative requirement can compensate to promote creativity during moderate procrastination. This suggests that a creative requirement deserves consideration as a substitute for intrinsic motivation, not merely as an antecedent of it.

Limitations and Future Directions

These contributions must be qualified in light of the limitations of our research. First, since we assessed the mediators and moderators in separate studies, future research is necessary to test the full

model. Second, our studies do not directly address how the motives behind procrastination or the choice of activities undertaken during procrastination shape its effects. When employees procrastinate because they are dissatisfied with their initial ideas, is it more beneficial than when they end up delaying due to self-regulatory failure or because they prefer to work under pressure? When employees choose to work on mindless tasks while procrastinating on a creative problem, does that free up cognitive resources (Elsbach & Hargadon, 2006; see also Baird et al., 2012) and minimize the costs of attention residue (Leroy, 2009)? If the alternative activity is highly intrinsically motivating, it may create a contrast effect that renders the delayed task more aversive (Shin & Grant, 2019). However, if the alternative activity is moderately interesting, it may create enthusiasm that spills over into the delayed task, which can increase creativity directly (Baas, De Dreu, & Nijstad, 2008) or by fueling emotional ambivalence (Fong, 2006) in concert with the guilt and anxiety that often accompany procrastination. More research examining the role of different motives behind procrastination and the content of activities undertaken during procrastination would be valuable.

Third, problem restructuring and the activation of new knowledge partially mediated the curvilinear effect of procrastination on creativity in our second experiment, raising unanswered questions about the additional mechanisms at play. One plausible candidate is the incubation process of selective forgetting, which involves abandoning initial solutions that are unoriginal or impractical (Sio & Ormerod, 2009). It is also feasible that our measures were not extensive enough to detect the full array of subconscious and conscious processes of incubation that fueled creativity. Further, procrastination may influence creativity through mechanisms beyond incubation. Along with facilitating idea generation, moderate procrastination may improve idea selection by freeing up time to reflect on the evaluation criteria of novelty and usefulness and overcome negative visceral reactions to novelty (Berg, 2016; Mueller, Melwani, & Goncalo, 2012). This also points to an explanation for why intrinsic motivation was less important as a facilitative moderator than a creative requirement: intrinsic motivation may encourage a focus on solutions that are novel but not necessarily useful (Grant & Berry, 2011). That said, it is possible that as intrinsic motivation approaches zero, creativity will falter.

Fourth, it would be helpful to have richer theory about the time intervals that qualify as moderate versus high procrastination. Although these will always be contingent on the duration and complexity of the task, it would be useful to develop guidelines for identifying the range in which procrastination is creatively productive. Since our research focused on procrastination in time-bound work, future studies should explore whether the observed effects extend to creativity in tasks without a deadline. Fifth, on a related note, our theory suggests that procrastination will only produce advantages after employees have some exposure to the task or have made some progress on the task, but we did not test how much task exposure or task progress is optimal in our studies. Broader questions about timing also remain unanswered since our field study was cross-sectional and our laboratory experiment focused on a single task. We encourage researchers to use experience sampling methods to track how the vicissitudes of procrastination and task engagement dynamics, such as improvisation and enactment, are related to creativity over time. It also remains to be seen whether the lack of emotional effects in our first experiment are due to the fact that we only measured affective states after participants had finished the creative task. Future studies could examine whether working on a task without procrastination creates an initial jolt of positive affect and a motivating sense of progress, whereas moderate procrastination yields greater enthusiasm about the final product and the adrenaline rush under high procrastination creates a surge of interest.

Sixth, whereas we focused on individual procrastination and creativity, there is value in understanding this relationship at the group level (Gino, Argote, Miron-Spektor, & Todorova, 2010; Tadmor, Satterstrom, Jang, & Polzer, 2012). When creativity for a particular project is sequentially interdependent, the procrastination of one team member could undermine team creativity, as it might slow down the progress of other team members (Van Eerde, 2015). Conversely, it may be that one team member's procrastination encourages moderate procrastination by others, which could facilitate incubation—provided that they are intrinsically motivated or working on creative tasks. It will also be useful to explore whether there are social mechanisms that explain the creative benefits of moderate procrastination. For example, procrastinating may increase the probability that employees collect unexpected insights and useful feedback from weak ties (Perry-Smith, 2006). Finally, beyond the consequences of procrastination, there is a need for research on its organizational antecedents. For example, what is the role of deadlines, and what kinds of deadlines would encourage moderate

procrastination? Whereas past studies have often been limited by the difficulty of studying procrastination with experimental precision, our research offers a paradigm for manipulating procrastination and measuring its extent in the laboratory and online, which may facilitate the exploration of these valuable questions.

Practical Implications and Conclusion

Procrastination is prevalent in the workplace, and it is a major source of stress. Research has linked it to feeling ashamed, guilty, and anxious (Sirois, 2014; Sirois & Pychyl, 2013). Since procrastination is often regarded as a form of self-regulatory failure, these negative emotional states often compound the problem and may lead to a "depression spiral" (Steel, 2007: 70). Given the difficulty of eliminating procrastination completely, there may be ways to harness it creatively. When novel and useful ideas are needed or intrinsic motivation is present, employees may find value in moderately delaying the start, progression, or completion of the task. In addition, leaders and managers may find ways to encourage creative procrastination, such as starting the innovation process by describing a problem without immediately asking for solutions or proposals. However, it would be important to ensure that procrastination does not preclude the doing of actual work. The point is not to give employees an excuse to procrastinate but rather to help them find the self-compassion to recognize that procrastination is not always detrimental, which may help to reduce extended procrastination (Sirois, 2014; Williams, Stark, & Foster, 2008).

In conclusion, although many employees struggle with procrastination, our research shows that when it comes to creativity, putting work off can sometimes pay off. Good ideas may come to those who procrastinate. "I racked up years and years of it," Margaret Atwood has said; "If we're going to do something, might as well be good at it, right? I'd hate to be a failed procrastinator" (Grant, 2020). In his notebook, da Vinci lamented, "Tell me if anything ever got done," but as Pannapacker (2009: B4) argued, "If creative procrastination, selectively applied, prevented Leonardo from finishing a few commissions—of minor importance when one is struggling with the inner workings of the cosmos—then only someone who is a complete captive of the modern cult of productive mediocrity . . . could fault him for it."

REFERENCES

Amabile, T. M. 1983. ***The social psychology of creativity***. New York, NY: Springer-Verlag.

Amabile, T. M. 1988. A model of creativity and innovation in organizations. ***Research in Organizational Behavior***, 10: 123–167.

Amabile, T. M. 1993. Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. ***Human Resource Management Review***, 3: 185–201.

Amabile, T. M. 1996. Creativity in context. Boulder, CO: Westview Press.

Amabile, T. M., Barsade, S. G., Mueller, J. S., & Staw, B. M. 2005. Affect and creativity at work. ***Administrative Science Quarterly***, 50: 367–403.

Anderson, J. H. 2016. Structured nonprocrastination: Scaffolding efforts to resist the temptation to reconstrue unwarranted delay. In F. M. Sirois & T. A. Pychyl (Eds.), ***Procrastination, health, and well-being***: 43–63. London, U.K.: Elsevier Academic Press.

Ashford, S. J., & Black, J. S. 1996. Proactivity during organizational entry: Antecedents, tactics, and outcomes. ***Journal of Applied Psychology***, 81: 199–214.

Baas, M., De Dreu, C. K., & Nijstad, B. A. 2008. A meta-analysis of 25 years of mood-creativity research: Hedonic tone, activation, or regulatory focus? ***Psychological Bulletin***, 134: 779–806.

Baer, M., & Oldham, G. R. 2006. The curvilinear relation between experienced creative time pressure and creativity: Moderating effects of openness to experience and support for creativity. ***Journal of Applied Psychology***, 91: 963–970.

Baird, B., Smallwood, J., Mrazek, M. D., Kam, J. W. Y., Franklin, M. S., & Schooler, J. W. 2012. Inspired by distraction: Mind wandering facilitates creative incubation. ***Psychological Science***, 23: 1117–1122.

Baumeister, R. F., & Heatherton, T. F. 1996. Self-regulation failure: An overview. ***Psychological Inquiry***, 7: 1–15.

Bazerman, M. H., Tenbrunsel, A. E., & Wade-Benzoni, K. 1998. Negotiating with yourself and losing: Making decisions with competing internal preferences. ***Academy of Management Review***, 23: 225–241.

Beerbohm, M. 1957. ***Mainly on the air***. London, U.K.: William Heinemann.

Berg, J. M. 2014. The primal mark: How the beginning shapes the end in the development of creative ideas. ***Organizational Behavior and Human Decision Processes***, 125: 1–17.

Berg, J. M. 2016. Balancing on the creative highwire: Forecasting the success of novel ideas in organizations. ***Administrative Science Quarterly***, 61: 433–468.

Beswick, G., Rothblum, E. D., & Mann, L. 1988. Psychological antecedents of student procrastination. ***Australian Psychologist***, 23: 207–217.

Bhardwaj, G., Crocker, A., Sims, J., & Wang, R. D. 2018. Alleviating the plunging-in bias, elevating strategic problem-solving. ***Academy of Management Learning & Education***, 17: 279–301.

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: 153–167.

Blunt, A. K., & Pychyl, T. A. 2005. Project systems of procrastinators: A personal project-analytic and action control perspective. ***Personality and Individual Differences***, 38: 1771–1780.

Bowers, K. S., Regehr, G., Balthazard, C., & Parker, K. 1990. Intuition in the context of discovery. ***Cognitive Psychology***, 22: 72–110.

Burka, J. B., & Yuen, L. M. 1983. ***Procrastination: Why you do it and what to do about it***. Reading, PA: Addison-Wesley.

Conlon, D. E., & Garland, H. 1993. The role of project completion information in resource allocation decisions. ***Academy of Management Journal***, 36: 402–413.

Coombs, C. H., & Avrunin, G. S. 1977. Single-peaked functions and the theory of preference. ***Psychological Review***, 84: 216–230.

Csikszentmihalyi, M., & Getzels, J. W. 1971. Discovery-oriented behavior and the originality of creative products: A study with artists. ***Journal of Personality and Social Psychology***, 19: 47–52.

Dane, E. 2011. Paying attention to mindfulness and its effects on task performance in the workplace. ***Journal of Management***, 37: 997–1018.

DeSimone, P. 1993. Linguistic assumptions in scientific language. Contemporary Psychodynamics: Theory, ***Research & Application***, 1: 8–17.

De Dreu, C. K., Baas, M., & Nijstad, B. A. 2008. Hedonic tone and activation level in the mood-creativity link: Toward a dual pathway to creativity model. ***Journal of Personality and Social Psychology***, 94: 739–756.

Dewitte, S., & Lens, W. 2000. Procrastinators lack a broad perspective. ***European Journal of Personality***, 14: 121–140.

Dijksterhuis, A., & Meurs, T. 2006. Where creativity resides: The generative power of unconscious thought. ***Consciousness and Cognition***, 15: 135–146.

Dijksterhuis, A., & Nordgren, L. R. 2006. A theory of unconscious thought. ***Perspectives on Psychological Science***, 1: 95–109.

Ellis, A., & Knaus, W. J. 1979. ***Overcoming procrastination***. New York, NY: New American Library.

Ellwood, S., Pallier, G., Snyder, A., & Gallate, J. 2009. The incubation effect: Hatching a solution? ***Creativity Research Journal***, 21: 6–14.

Elsbach, K. D., & Hargadon, A. B. 2006. Enhancing creativity through "mindless" work: A framework of workday design. ***Organization Science***, 17: 470–483.

Ferrari, J. R. 1992. Procrastination in the workplace. Attributions for failure among individuals with similar behavioral tendencies. ***Personality and Individual Differences***, 13: 315–319.

Ferrari, J. R. 2001. Procrastination as self-regulation failure of performance: Effects of cognitive load, self-awareness, and time limits on "working best under pressure." ***European Journal of Personality***, 15: 391–406.

Ferrari, J. R., Johnson, J. L., & McCown, W. G. 1995. ***Procrastination and task avoidance: Theory, research, and treatment***. New York, NY: Plenum Press.

Ferrari, J. R., O'Callaghan, J., & Newbegin, I. 2005. Prevalence of procrastination in the United States, United Kingdom, and Australia: Arousal and avoidance delays among adults. ***North American Journal of Psychology***, 7: 1–6.

Fong, C. T. 2006. The effects of emotional ambivalence on creativity. ***Academy of Management Journal***, 49: 1016–1030.

Förster, J., Friedman, R. S., & Liberman, N. 2004. Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition. ***Journal of Personality and Social Psychology***, 87: 177–189.

Gagné, M., & Deci, E. L. 2005. Self-determination theory and work motivation. ***Journal of Organizational Behavior***, 26: 331–362.

George, J. M. 2007. Creativity in organizations. ***Academy of Management Annals***, 1: 439–477.

Gersick, C. J. 1994. Pacing strategic change: The case of a new venture. ***Academy of Management Journal***, 37: 9–45.

Gino, F., Argote, L., Miron-Spektor, E., & Todorova, G. 2010. First, get your feet wet: The effects of learning from direct and indirect experience on team creativity. ***Organizational Behavior and Human Decision Processes***, 111: 102–115.

Gollwitzer, P. M., & Bayer, U. 1999. Deliberative versus implemental mindsets in the control of action. In S. Chaiken & Y. Trope (Eds.), ***Dual-process theories in social psychology***: 403–422. New York, NY: Guilford Press.

Goncalo, J. A., & Staw, B. M. 2006. Individualism-collectivism and group creativity. ***Organizational Behavior and Human Decision Processes***, 100: 96–109.

Gong, Y., Wu, J., Song, L. J., & Zhang, Z. 2017. Dual tuning in creative processes: Joint contributions of intrinsic and extrinsic motivational orientations. ***Journal of Applied Psychology***, 102: 829–844.

Grant, A. M. 2008. Does intrinsic motivation fuel the prosocial fire? Motivational synergy in predicting persistence, performance, and productivity. ***Journal of Applied Psychology***, 93: 48–58.

Grant, A. M. 2020. The real reason you procrastinate. ***WorkLife***, TED. Retrieved from https://podcasts.apple.com/us/podcast/the-real-reason-you-procrastinate/id1346314086?i=1000467969321

Grant, A. M., & Berry, J. 2011. The necessity of others is the mother of invention: Intrinsic and prosocial motivations, perspective-taking, creativity. ***Academy of Management Journal***, 54: 73–96.

Grant, A. M., Nurmohamed, S., Ashford, S. J., & Dekas, K. 2011. The performance implications of ambivalent initiative: The interplay of autonomous and controlled motivations. ***Organizational Behavior and Human Decision Processes***, 116: 241–251.

Grant, A. M., & Schwartz, B. 2011. Too much of a good thing: The challenge and opportunity of the inverted U. ***Perspectives on Psychological Science***, 6: 61–76.

Guilford, J. P. 1957. Creative abilities in the arts. ***Psychological Review***, 64: 110–118.

Haans, R. F. J., Pieters, C., & He, Z. L. 2016. Thinking about U: Theorizing and testing U- and inverted U-shaped relationships in strategy research. ***Strategic Management Journal***, 37: 1177–1195.

Hammer, C. A., & Ferrari, J. R. 2002. Differential incidence of procrastination between blue and white-collar workers. ***Current Psychology***, 21: 333–338.

Harmon-Jones, C., Bastian, B., & Harmon-Jones, E. 2016. The discrete emotions questionnaire: A new tool for measuring state self-reported emotions. ***PLoS One***, 11: e0159915.

Harriott, J., & Ferrari, J. 1996. Prevalence of procrastination among samples of adults. ***Psychological Reports***, 78: 611–616.

Harris, N. N., & Sutton, R. I. 1983. Task procrastination in organizations: A framework for research. ***Human Relations***, 36: 987–995.

Hayes, A. F., & Preacher, K. J. 2010. Quantifying and testing indirect effects in simple mediation models when the constituent paths are nonlinear. ***Multivariate Behavioral Research***, 45: 627–660.

Humphrey, S. E., Moon, H., Conlon, D. E., & Hofmann, D. A. 2004. Decision making and behavior fluidity: How focus on completion and emphasis on safety changes over the course of projects. ***Organizational Behavior and Human Decision Processes***, 93: 14–27.

Kasper, G. 2004. Tax procrastination: Survey finds 29% have yet to begin taxes. Retrieved from www.prweb.com/releases/2004/03/prweb114250.htm

Klein, E. 1971. ***A comprehensive etymological dictionary of the English language***. New York, NY: Elsevier.

Knaus, W. J. 1998. ***Do it now: How to break the procrastination habit***. New York, NY: John Wiley & Sons.

Knaus, W. J. 2000. Procrastination, blame, and change. ***Journal of Social Behavior and Personality***, 15: 153–166.

Knoblich, G., Ohlsson, S., Haider, H., & Rhenius, D. 1999. Constraint relaxation and chunk decomposition in insight problem solving. ***Journal of Experimental Psychology. Learning, Memory, and Cognition***, 25: 1534–1555.

Kruglanski, A. W., Chernikova, M., Babush, M., Dugas, M., & Schumpe, B. M. 2015. The architecture of goal systems: Multifinality, equifinality, and counterfinality in means-ends relations. ***Advances in Motivation Science***, 2: 69–98.

Kruglanski, A. W., Fishbach, A., Woolley, K., Bélanger, J. J., Chernikova, M., Molinario, E., & Pierro, A. 2018. A structural model of intrinsic motivation: On the psychology of means-ends fusion. ***Psychological Review***, 125: 165–182.

Kruglanski, A. W., & Webster, D. M. 1996. Motivated closing of the mind: Seizing and freezing. ***Psychological Review***, 103: 263–283.

Lay, C. 1986. At last, my research article on procrastination. ***Journal of Research in Personality***, 20: 474–495.

LeBreton, J. M., & Senter, J. L. 2008. Answers to 20 questions about interrater reliability and interrater agreement. ***Organizational Research Methods***, 11: 815–852.

Leroy, S. 2009. Why is it so hard to do my work? The challenge of attention residue when switching between work tasks. ***Organizational Behavior and Human Decision Processes***, 109: 168–181.

Little, B. R., Salmela-Aro, K. E., & Phillips, S. D. 2007. ***Personal project pursuit: Goals, action, and human flourishing***. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Llopis, O., & Foss, N. J. 2016. Understanding the climate-knowledge sharing relation: The moderating roles of intrinsic motivation and job autonomy. ***European Management Journal***, 34: 135–144.

Lu, J. G., Akinola, M., & Mason, M. F. 2017. "Switching on" creativity: Task switching can increase creativity by reducing cognitive fixation. ***Organizational Behavior and Human Decision Processes***, 139: 63–75.

Lucas, B. J., & Nordgren, L. F. 2015. People underestimate the value of persistence for creative performance. ***Journal of Personality and Social Psychology***, 109: 232–243.

Luchins, A. S. 1940. Mechanization in problem solving: The effect of Einstellung. ***Psychological Monographs***, 54: 1–95.

Macan, T. H. 1994. Time management: Test of a process model. ***The Journal of Applied Psychology***, 79: 381–391.

MacGregor, J. N., Ormerod, T. C., & Chronicle, E. P. 2001. Information processing and insight: A process model of performance on the nine-dot and related problems. ***Journal of Experimental Psychology. Learning, Memory, and Cognition***, 27: 176–201.

Mainemelis, C. 2010. Stealing fire: Creative deviance in the evolution of new ideas. ***Academy of Management Review***, 35: 558–578.

Mann, L. 1982. Decisional procrastination scale. In J. R. Ferrari, J. L. Johnson, & W. McCown (Eds.), ***Procrastination and task avoidance: Theory, research, and treatment***: 61–63. New York, NY: Plenum Publications.

Martin, L. L., Ward, D. W., Achee, J. W., & Wyer, R. S. 1993. Mood as input: People have to interpret the motivational implications of their moods. ***Journal of Personality and Social Psychology***, 64: 317–326.

McCown, W., & Johnson, J. 1989. Validation of an adult inventory of procrastination. Paper presented at the Society for Personality Assessment, New York, NY.

McCrea, S. M., Liberman, N., Trope, Y., & Sherman, S. J. 2008. Construal level and procrastination. ***Psychological Science***, 19: 1308–1314.

McGuirk, K. L. 1997. The diary of Thomas Edison. New York, NY: Chatham Press.

Milgram, N. A. 1991. Procrastination. In R. Dulbecco (Ed.), ***Encyclopedia of human biology***, vol. 6: 149–155. New York: Academic Press.

Milgram, N. A. 1992. El restraso: Una enfermedad de los tempos modernos. ***Boletín de Psicología***, 35: 83–102.

Mitchell, T. R., & Daniels, D. 2003. Motivation. In W. C. Borman, D. R. Ilgen, & R. J. Klimoski (Eds.), Handbook of psychology, volume twelve: Industrial and organizational psychology*:* 225–254. New York, NY: John Wiley.

Morgeson, F. P., & Humphrey, S. E. 2006. The work design questionnaire (WDQ): Developing and validating a comprehensive measure for assessing job design and the nature of work. ***Journal of Applied Psychology***, 91: 1321–1339.

Mueller, J. S., Melwani, S., & Goncalo, J. A. 2012. The bias against creativity: Why people desire but reject creative ideas. ***Psychological Science***, 23: 13–17.

Myrick, J. G. 2015. Emotion regulation, procrastination, and watching cat videos online: Who watches internet cats, why, and to what effect? ***Computers in Human Behavior***, 52: 168–176.

Nguyen, B., Steel, P., & Ferrari, J. R. 2013. Procrastination's impact in the workplace and the workplace's impact on procrastination. ***International Journal of Selection and Assessment***, 21: 388–399.

Oates, J. C. 1983. ***First person singular: Writers on their craft***. Princeton, NJ: Ontario Review Press.

Oldham, G. R., & Cummings, A. 1996. Employee creativity: Personal and contextual factors at work. ***Academy of Management Journal***, 39: 607–634.

Pannapacker, W. A. 2009. How to procrastinate like Leonardo da Vinci. ***Chronicle of Higher Education***, 55: B4–B5.

Parker, S. K., Bindl, U. K., & Strauss, K. 2010. Making things happen: A model of proactive motivation. ***Journal of Management***, 36: 827–856.

Perry-Smith, J. 2006. Social yet creative: The role of social relationships in facilitating individual creativity. ***Academy of Management Journal***, 49: 85–101.

Pierce, J. R., & Aguinis, H. 2013. The too-much-of-a-good-thing effect in management. ***Journal of Management***, 39: 313–338.

Purtill, C. 2017. What your YouTube habit is really costing your company. ***Quartz.*** Retrieved from https://qz.com/work/1130617/what-your-youtube-habit-is-really-costing-your-company/

Pychyl, T. A., & Little, B. R. 1998. Dimensional specificity in the prediction of subjective well-being: Personal projects in pursuit of the Ph.D. ***Social Indicators Research***, 45: 423–473.

Rapp, A. A., Bachrach, D. G., & Rapp, T. L. 2013. The influence of time management skill on the curvilinear relationship between organizational citizenship behavior and task performance. ***Journal of Applied Psychology***, 98: 668–677.

Robb, H. 1998. Reducing procrastination in the workplace. In S. Klarreich (Ed.), ***Handbook of organizational health psychology: Programs to make the workplace healthier***: 55–77. Madison, CT: Psychosocial Press.

Rogelberg, S. G., & Stanton, J. M. 2007. Introduction: Understanding and dealing with organizational survey nonresponse. ***Organizational Research Methods***, 10: 195–209.

Rosenbaum D. A., Fournier, L. R., Levy-Tzedek, S., McBride, D. M., Rosenthal, R., Sauerberger, K., VonderHaar, R. L., Wasserman, E. A., & Zentall, T. R. 2019. Sooner rather than later: Precrastination rather than procrastination. ***Current Directions in Psychological Science***, 28: 229–233.

Rosenbaum, D. A., Gong, L., & Potts, C. A. 2014. Precrastination: Hastening subgoal completion at the expense of extra physical effort. ***Psychological Science***, 25: 1487–1496.

Runco, M. A. 2004. Creativity. ***Annual Review of Psychology***, 55: 657–687.

Ryan, R. M., & Deci, E. L. 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. ***American Psychologist***, 55: 68–78.

Schraw, G., Wadkins, T., & Olafson, L. 2007. Doing the things we do: A grounded theory of academic procrastination. ***Journal of Educational Psychology***, 99: 12–25.

Seelig, T. 2009, August 5. The $5 challenge! ***Psychology Today***. Retrieved from www.psychologytoday.com/us/blog/creativityrulz/200908/the-5-challenge

Senécal, C., Koestner, R., & Vallerand, R. J. 1995. Self-regulation and academic procrastination. ***Journal of Social Psychology***, 135: 607–619.

Shah, J. Y., Friedman, R. S., & Kruglanski, A. W. 2002. Forgetting all else: On the antecedents and consequences of goal shielding. ***Journal of Personality and Social Psychology***, 83: 1261–1280.

Shalley, C. E. 1991. Effects of productivity goals, creativity goals, and personal discretion on individual creativity. ***Journal of Applied Psychology***, 76: 179–185.

Shalley, C. E. 1995. Effects of coaction, expected evaluation, and goal setting on creativity and productivity. ***Academy of Management Journal***, 38: 483–503.

Shalley, C. E., Gilson, L. L., & Blum, T. C. 2000. Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave. ***Academy of Management Journal***, 43: 215–223.

Shalley, C. E., Zhou, J., & Oldham, G. R. 2004. The effects of personal and contextual characteristics on creativity: Where should we go from here? ***Journal of Management***, 30: 933–958.

Shin, J., & Grant, A. M. 2019. Bored by interest: Intrinsic motivation in one task can reduce performance on other tasks. ***Academy of Management Journal***, 62: 415–436.

Silvia, P. 2008. Interest: The curious emotion. ***Current Directions in Psychological Science***, 17: 57–60.

Simonsohn, U. 2018. Two lines: A valid alternative to the invalid testing of *U*-shaped relationships with quadratic regressions. ***Advances in Methods and Practices in Psychological Science***.

Simonton, D. K. 2013. What is a creative idea? Little-c versus Big-C creativity. In K. Thomas & J. Chan (Eds.), ***Handbook of research on creativity***: 69–83. Northampton, MA: Edward Elgar Publishing.

Sio, U. N., & Ormerod, T. C. 2009. Does incubation enhance problem solving? A meta-analytic review. Psychological Bulletin, 135: 94–120.

Sirois, F. M. 2014. Procrastination and stress: Exploring the role of self-compassion. ***Self and Identity***, 13: 128–145.

Sirois, F., & Pychyl, T. 2013. Procrastination and the priority of short-term mood regulation: Consequences for future self. ***Social and Personality Psychology Compass***, 7: 115–127.

Soderberg, C. K., Callahan, S. P., Kochersberger, A. O., Amit, E., & Ledgerwood, A. 2015. The effects of psychological distance on abstraction: Two meta-analyses. ***Psychological Bulletin***, 141: 525–548.

Staw, B. M., Sandelands, L. E., & Dutton, J. E. 1981. Threat rigidity effects in organizational behavior: A multilevel analysis. ***Administrative Science Quarterly***, 26: 501–524.

Steel, P. 2007. The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. ***Psychological Bulletin***, 133: 65–94.

Steel, P. 2010. ***The procrastination equation: How to stop putting things off and start getting stuff done***. New York, NY: HarperCollins Publishers.

Steel, P., Brothen, T., & Wambach, C. 2001. Procrastination and personality, performance, and mood. ***Personality and Individual Differences***, 30: 95–106.

Subotnik, R., Steiner, C., & Chakraborty, B. 1999. Procrastination revisited: The constructive use of delayed response. ***Creativity Research Journal***, 12: 151–160.

Taber, T. D., & Alliger, G. M. 1995. Task-level assessment of job satisfaction. ***Journal of Organizational Behavior***, 16: 101–121.

Tadmor, C., Satterstrom, P., Jang, S., & Polzer, J. 2012. Beyond individual creativity: The superadditive benefits of multicultural experience for collective creativity in culturally diverse teams. ***Journal of Cross-Cultural Psychology***, 43: 384–392.

Tierney, P., & Farmer, S. M. 2002. Creative self-efficacy: Its potential antecedents and relationship to creative performance. ***Academy of Management Journal***, 45: 1137–1148.

Tierney, P., Farmer, S. M., & Graen, J. B. 1999. An examination of leadership and employee creativity: The relevance of traits and relationships. ***Personnel Psychology***, 52: 591–620.

Torrance, P., & Safter, T. H. 1991. ***Incubation model of teaching: Getting beyond the aha!*** Buffalo, NY: Bearly Limited.

Trope, Y., & Liberman, N. 2003. Temporal construal. ***Psychological Review***, 110: 403–421.

Trope, Y., & Liberman, N. 2010. Construal-level theory of psychological distance. ***Psychological Review***, 117: 440–463.

Unsworth, K. 2001. Unpacking creativity. ***Academy of Management Journal***, 26: 289–297.

Unsworth, K. L., Wall, T. D., & Carter, A. 2005. Creative requirement: A neglected construct in the study of employee creativity? ***Group & Organization Management***, 30: 541–560.

Vallerand, R. J. 1997. Toward a hierarchical model of intrinsic and extrinsic motivation. ***Advances in Experimental Social Psychology***, 29: 271–360.

Vallerand, R. J. 2001. Deci and Ryan's self-determination theory: A view from the hierarchical model of intrinsic and extrinsic motivation. ***Psychological Inquiry***, 11: 312–318.

Van Dyne, L., Jehn, K. A., & Cummings, A. 2002. Differential effects of strain on two forms of work performance: Individual employee sales and creativity. ***Journal of Organizational Behavior***, 23: 57–74.

Van Eerde, W. 2000. Procrastination: Self-regulation in aversive goals. ***Applied Psychology***, 49: 372–389.

Van Eerde, W. 2003. A meta-analytically derived nomological network of procrastination. ***Personality and Individual Differences***, 35: 1401–1418.

Van Eerde, W. 2015. Time management and procrastination. In M. D. Mumford & M. Frese (Eds.), ***The psychology of planning in organizations: Research and applications***: 312–333. New York, NY: Routledge.

Vangsness, L., & Young, M. E. 2020. Turtle, task ninja, or time waster? Who cares? Traditional task-completion strategies are overrated. ***Psychological Science***, 31: 306–315.

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: 671–688.

Wasserman, E. A. 2018. Precrastination: The fierce urgency of now. ***Learning & Behavior***, 47: 1–22.

Wieth, M. B., & Zacks, R. T. 2011. Time of day effects on problem solving: When the non-optimal is optimal. ***Thinking & Reasoning***, 17: 387–401.

Williams, J. G., Stark, S. K., & Foster, E. E. 2008. Start today or the very last day? The relationships among self-compassion, motivation, and procrastination. ***American Journal of Psychological Research***, 4: 37–44.

Wolters, C. A. 2003. Understanding procrastination from a self-regulated learning perspective. ***Journal of Educational Psychology***, 95: 179–187.

Wong, C., & Campion, M. A. 1991. Development and test of a task level model of motivational job design. ***Journal of Applied Psychology***, 76: 825–837.

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: 559–580.

Jihae Shin (jihae.shin@yale.edu) is a visiting faculty at Yale School of Management, Yale University. She received her PhD from the Wharton School at the University of Pennsylvania. She studies work motivation, creativity, and decision-making under uncertainty.

Adam M. Grant (grantad@wharton.upenn.edu) is the Saul P. Steinberg Professor of Management and a professor of psychology at the Wharton School at the University of Pennsylvania. He studies work motivation, job design, and prosocial and proactive behaviors. He is a precrastinator by disposition but ended up putting this paper off for a little while.