

**TELL ME WHAT TO DO NOT HOW TO DO IT: INFLUENCE OF  
CREATIVITY GOALS AND PROCESS GOALS ON INTRINSIC  
MOTIVATION AND CREATIVE PERFORMANCE**

by

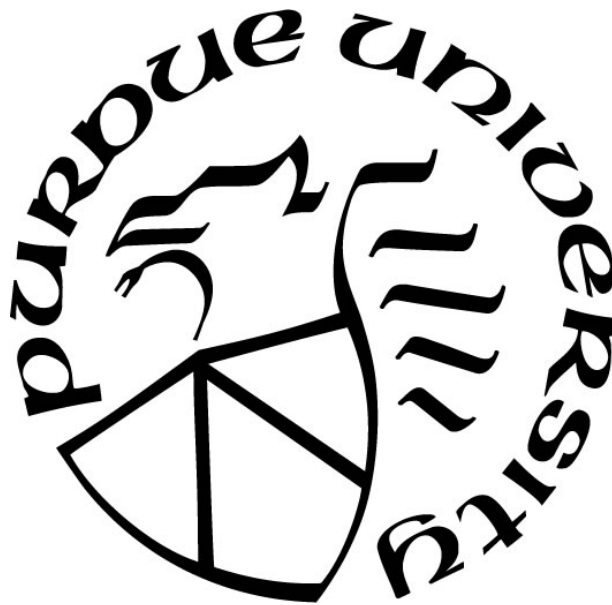
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## ABSTRACT

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Title: Tell Me What To Do Not How To Do It: Influence of Creativity Goals and Process Goals on Intrinsic Motivation and Creative Performance

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Previous research has identified creativity goals and process goals as two contextual interventions for enhancing creativity in the workplace. Whereas creativity goals direct attention and effort toward outcomes that are both novel and useful, process goals direct attention and effort toward the creative process – behaviors and cognitions intended to enhance creative outcomes. The current research draws from past research and theory on goals and intrinsic motivation to explain how creativity goals and process goals influence creative performance, and perhaps more importantly, *why*. Specifically, I suggest that creativity goals have a direct, positive relationship with creative performance; however, process goals have an indirect, positive relationship with creative performance through creative process engagement. Additionally, specificity has the ability to focus attention on relevant processes and outcomes within the creativity criterion space. While specific creativity goals are predicted to direct attention toward desirable solutions without thwarting needs for autonomy, specific (i.e., structured) process goals may thwart autonomy perceptions, resulting in lower levels of intrinsic motivation, and ultimately creative performance. The hypotheses proposed were examined in a sample of 560 undergraduate students utilizing a 3 (creativity goals: specific, general, and no goal) x 3 (process goals: structured, semi-structured, and no goals) between-subjects experimental design. Results revealed creativity goals, particularly specific creativity goals, have a



direct positive influence on creative performance. Process goals have an indirect positive relationship on creative performance through creative process engagement. Moreover, process goals have a negative impact on perceptions of autonomy, which in turn negatively impacts creative performance by reducing intrinsic motivation. The specific creativity goal had the strongest effects and appears to be an effective way to enhance both creative process engagement and creative performance. Taken together, these findings suggest that goals are a tenable means of enhancing creative performance; however, care should be taken to reduce adverse consequences for autonomy perceptions.

## INTRODUCTION

Creativity, defined as an outcome that is both novel (i.e., new, unique) and useful (i.e., appropriate, valuable), is widely recognized as an important driver of innovation, adaptation, and growth (Amabile, 1982; Barron, 1955; Ford & Gioia, 2000; Mumford, 2003; Sternberg & Lubart, 1996; Zhou & Hoever, 2014). Boston Consulting Group named creativity and innovation as a top strategic imperative in 2010 with 72% of their respondents reporting that innovation was one of their top three priorities. Those organizations able to harness human capital and implement ideas from the workforce are at a competitive advantage compared to organizations unable to do so (Subramaniam & Youndt, 2005). An important task for managers and organizations is to *effectively* support creativity while also removing barriers that might “kill creativity” (Amabile, 1998). Thus, understanding how contextual factors influence creative performance in the workplace is an organizational imperative.

Recent theory has advocated dividing the creativity criterion space into two distinct but related criterion spaces – the creative process and creative outcomes (Montag, Maertz, & Baer, 2012). Whereas the creative process involves behaviors and cognitions commonly conceived of as part of creative problem solving, creative outcomes mirror the commonly accepted definition of an outcome that is both novel and useful. Drawing from this, the current research focuses on two contextual interventions directed at these criterion spaces: creative outcome goals and creative process goals. Past research on creativity goals suggests that setting goals to “be creative” enhances creative outcomes by directing attention toward the “what” – outcomes that are novel and useful (Chen, Kasof, Himself, Dmitrieva, Dong, & Xue, 2005; Evans & Forbach, 1983; Harrington, 1975;

Shalley, 1991, 1995). Conversely, research on the creative process focuses on the “how” – directing attention toward behavioral and cognitive strategies for enhancing creative outcomes (i.e., problem definition, idea generation, and idea evaluation).

In a series of studies, Keith and Jagacinski (2019b) found support for creativity goals; however, process goals did not directly impact creative performance as expected. We speculated that process goals may have resulted in lower levels of perceived autonomy, particularly because these goals were more specific (i.e., structured) than the non-specific (i.e., general) creativity goal given. The current research attempts to extend this line of research by examining the role of goal specificity and examining psychological mechanisms that might mediate the relationships between different types of goals and creative performance. I draw from past research on the componential framework of creativity (Amabile, 1983, 1988) and self-determination theory (Deci & Ryan, 1985) to explain *why* creativity goals and process goals influence creative performance by examining psychological and motivational mechanisms – autonomy and intrinsic motivation.

## **Creativity**

### **Defining Creativity**

Before examining contextual and motivational influences on creative performance, we must start by defining what is meant by creativity and creative performance. Perhaps unsurprisingly, the academic literature attempting to define this arguably very abstract construct is vast. The variety of perspectives on creativity reflect the construct as a dynamic interplay between the person, the environment, the process, and the outcome (Rhodes, 1961).

Early psychological research on creativity grew out of the giftedness literature, and as a result, defined creativity as a characteristic of individuals (e.g., Albert, 1969; Eysenck, 1995; Gough, 1979). Specifically, while everyone was predicted to be capable of creativity, some may be more naturally creative than others. Taking this perspective, Guilford (1950) defined creativity as abilities characteristic of creative people. What followed was a focused attempt to understand what it meant to be a “creative person,” including a focus on cognitive ability/giftedness (Runco & Albert, 1986), creative personality (Cattell & Butcher, 1970; Gough, 1979; Gough & Heilbrun, 1965; Helson, 1996), and divergent thinking ability (Guilford, 1956; Torrance, 1974). While examining individual difference predictors of creativity is certainly valuable, defining creativity as the characteristics of a creative person has been argued as tautological and circular in its definition (Brown, 1989).

Over time, research on creativity has shifted its definition of creativity to focus on outcomes. Proponents of the outcome (or product) perspective of creativity argue that we would not know that a person is creative without evaluating their ideas, products, or other outcomes. The now widely accepted definition of creativity defines creative outcomes as those judged to be both novel and useful (Barron, 1955; Cropley & Cropley, 2010; Ford & Gioia, 2000; Runco & Charles, 1993; Runco, Illies, & Eisenman, 2005). To be novel, the outcome must be regarded as new or original. Notably, what is considered new is likely context dependent; novelty is a function of the time, domain, and other contextual factors (Cropley, 2006; Csikszentmihalyi, 1999). In addition to originality, creativity also requires usefulness. That is, creative outcomes must also be valuable or appropriate for a given context. For example, an axe with a wooden head would not be considered creative

because it is novel but not useful; it cannot be used for the intended purpose of chopping wood.

### **The Creative Process**

Although the product definition of creativity has been widely accepted in the literature, focusing solely on creative outcomes does not explain how individuals arrive at the creative outcome. Montag and colleagues (2012) argued that the creativity criterion space is made up of two distinct but related criterion spaces: creative performance behaviors and creative outcome effectiveness. Creative outcome effectiveness mirrors the consensual definition of creativity – outcomes that are both novel and useful. Creative performance behaviors – henceforth referred to as creative process behaviors – are the cognitive and behavioral stages or micro processes that can lead to creative outcomes (Baughman & Mumford, 1995; Mumford, Mobley, Reiter-Palmon, Uhlman, & Doares, 1991; Newell & Simon, 1972; Unsworth & Clegg, 2010). Distinguishing between the creative process and creative outcomes highlights the complex nature of the creativity phenomenon and acknowledges that, in practice, engagement in the creative process may not always result in a creative outcome (Drazin, Glynn, & Kazanjian, 1999).

Theory and research on the creative process has a very long history (Busse & Mansfield, 1980; Lubart, 2001) with literature spanning nearly a century identifying a number of processes and subprocesses that have come to be recognized as the creative process (Amabile, 1996; Guilford, 1967; Mumford et al., 1991; Wallas, 1926). Models of the creative process or creative problem solving differ in the number of stages and behaviors/cognitions proposed. The earliest research on the creative process tended to draw from personal experiences and focus on unconscious processes (e.g., Osborn, 1953;

Wallas, 1926). For example, Wallas (1926) defined four stages of the creative process: preparation (analysis and definition of the problem; gathering relevant information), incubation (unconsciously forming associations), illumination (flash of insight often referred to as the “aha moment”), and verification (deducing consequences of insight). More recently, researchers have emphasized more conscious behaviors and cognitions that are more easily observed, manipulated, and measured. Although a number of models of this nature exist, most models include some version of problem definition, idea generation, and idea evaluation (Medeiros, Steele, Watts, & Mumford, 2018; Montag et al., 2012). Below I define each of these stages and summarize research on how each stage relates to creative outcomes.

**Problem definition.** Before an individual can solve a problem, that problem must be either discovered or presented (Csikszentmihalyi & Getzels, 1971). Both of these behaviors fall under the umbrella of what is often viewed as the start of the creative process – problem definition (sometimes called problem construction or problem identification; Reiter-Palmon, Mumford, O'Connor-Boes, & Runco, 1997; Reiter-Palmon & Robinson, 2009). During this process, individuals work to define the parameters of the problem (Mumford, Reiter-Palmon, & Redmond, 1994; Reiter-Palmon & Robinson, 2009; Reiter-Palmon et al., 1997). Problem definition often occurs automatically; however, active engagement in problem definition is more likely to result in higher levels of creative performance (Reiter-Palmon et al., 1997; Reiter-Palmon, Mumford, & Threlfall, 1998). In a meta-analysis of different variables associated with creativity, Ma (2009) found that problem definition had a mean effect size ( $d$ ) of .67 for originality of a solution and .63 for the quality (i.e., usefulness) of a solution.

**Idea generation.** Once a problem is defined, individuals often generate ideas for solving the problem using the information available (Mumford et al., 1991; Nijstad & Stroebe, 2006; Reiter-Palmon & Arreola, 2015; Rietzschel, Nijstad, & Stroebe, 2007). Idea generation is perhaps the most often studied part of the creative process, as it is sometimes used as a proxy for creative outcomes (e.g., Batey, Chamorro-Premuzic, & Furnham, 2009). That is, researchers frequently use indices of idea generation as the dependent variable(s) (i.e., fluency, flexibility, elaboration, originality) rather than rating a final outcome on dimensions of novelty and usefulness. I concur with past research that emphasizes that idea generation should be examined as one stage of the creative process rather than as a proxy for creativity (Montag et al., 2012; Runco, 2004).

The relationship between idea generation and creative performance has been mixed, with limited research examining the relationship between idea generation and external ratings of creativity. Ma (2009) reported an average effect size ( $d$ ) of .58 between idea generation and solution originality and 0.57 between idea generation and solution quality; however, these mean effect sizes were only based on three and four effect sizes, respectively. More recently, Reiter-Palmon and Arreola (2015) compared the idea generation paradigm and the creative problem solving paradigm where the idea generation paradigm has participants come up with multiple solutions, and the creative problem solving paradigm asks participants to generate one final solution. They found that the average idea originality and quality was significantly lower in the idea generation paradigm than the originality and quality of the idea generated in the creative problem solving paradigm. This finding also held when comparing the participant selected best solution in the idea generation paradigm to the creative problem solving paradigm.

Additionally, idea generation is often measured as fluency (or the number of ideas generated); however, Reiter-Palmon and Arreola (2015) found that fluency was negatively related to average idea quality, subject selected best quality, and subject selected best originality. Thus, while idea generation may be an important stage of the creative process, it does not guarantee that individuals will be able to select their best ideas.

**Idea evaluation.** Sometimes called idea verification or testing, idea evaluation, involves judging an idea against criteria and forecasting the implementation of that idea (Mumford, Lonergan, & Scott, 2002). Although an arguably important part of the creative process, idea evaluation has received significantly less attention in the empirical research relative to other components of the creative process such as idea generation (Blair & Mumford, 2007; Byrne, Shipman, & Mumford, 2010; Herman & Reiter-Palmon, 2011; Lonergan, Scott, & Mumford, 2004; McIntosh, 2018). Ma's (2009) meta-analysis includes generating evaluation criteria for selecting a solution; however, idea evaluation itself is not included.

### **Measuring Creative Outcomes and Creative Process Behaviors**

Novelty and usefulness have different antecedents and outcomes and should be considered distinct dimensions of creativity (Ford & Gioia, 2000; Montag et al., 2012; Sullivan & Ford, 2010). While there is wide consensus on this operational definition, creativity research has traditionally faced a criterion problem, whereby many attempts to measure creativity fail to measure novelty and usefulness as separate dimensions of creativity (Montag et al., 2012; Sullivan & Ford, 2010). To address the criterion problem plaguing creativity research, Amabile (1982) proposed using what she termed "the



consensual assessment technique.” Although a number of variations of this technique have evolved over the decades (Cseh & Jeffries, in press), the consensual assessment technique uses judges (or coders) to rate creative outcomes relative to one another on the dimensions of novelty and usefulness. The technique has emerged as the “gold standard” for evaluating creative outcomes (Baer & McKool, 2009; Plucker & Makel, 2010). As the two dimensions are considered multiplicative, recent iterations of this technique take the product of novelty and usefulness ratings to measure creativity (Glăveanu, Gillespie, & Karwowski, in press; Simonton, 2012; Zhou & Oldham, 2001). To remain parsimonious, I use “creative performance” when referring to novelty, usefulness, and creativity.

Despite the theoretical connection between the creative process criterion space and the creative outcome criterion space, empirical research examining the creative process as a whole remains limited, particularly in relation to creative outcomes (Montag et al., 2012). Researchers frequently examine individual stages of the creative process in isolation (e.g., how problem construction relates to creative performance; Reiter-Palmon et al., 1997) with a few notable exceptions (e.g., Medeiros et al., 2018; Mumford, Supinski, Baughman, Costanza, & Threlfall, 1997). Examinations of the creative process are further complicated by the largely invisible cognitive processes taking place alongside the more visible behaviors (Ward, Smith, & Finke, 1999; Weisberg, 1993). Although self-reports are subject to certain limitations (Baer, 1998; Ng & Feldman, 2012; Reiter-Palmon, Robinson-Morrall, Kaufman, & Santo, 2012), they are not inherently invalid (Ng & Feldman, 2012) and measuring the creative process through self-reports may illuminate some of the less visible aspects.

Creative process engagement or “involvement in creativity-relevant methods or processes” (Zhang & Bartol, 2010a, p. 108) has been measured using self-reports in a number of recent studies (Henker, Sonnentag, & Unger, 2015; Tan, Lau, & Lee, in press; Zhang & Bartol, 2010a, 2010b). These studies found support for the relationship between creative process engagement and supervisor ratings of creative performance (Zhang & Bartol, 2010a, 2010b) and self-ratings of creative performance (Henker et al., 2015; Tan et al., 2017). To my knowledge, this measure has not been used in any published studies utilizing external ratings of creative outcomes. Zhang and Bartol’s (2010a) measure of creative process engagement includes problem identification (i.e., problem definition), information search, and idea generation subscales; however, idea evaluation is omitted from this scale. Although these subscales exist, the measure is often examined as creative process engagement or an average of these subscales rather than examining the relationship between each creative process behavior and the outcome of interest (cf., Henker et al., 2015). In the current research, creative process engagement is considered an outcome measure of the creative process criterion space.

### **Goals and Creativity**

Goals are contextual interventions that have been widely applied in the organizational and psychological literature as a means of enhancing motivation, productivity, and performance across a number of domains (Locke & Latham, 1990, 2002; Locke, Shaw, Saari, & Latham, 1981). Put simply, goals direct attention by specifying “an object or aim of an action” (Locke & Latham, 2002, p. 705). While goals have been widely applied to performance settings, goals in the creative performance context will likely differ in content and possibly effectiveness.

There are important differences between productivity outcomes and creativity outcomes that pose obstacles for applying traditional goal setting to creativity tasks. To begin, creativity is concerned with quality rather than quantity of an outcome. Thus, setting a goal to increase the quantity of an outcome will not increase creativity unless a quality goal is also present (Austin & Bobko, 1985; Shalley, 1991). Second, one of the benefits of goal setting is feedback gleaned from goal striving (Ashford & De Stobbeleir, 2013; Locke & Latham, 2013); however, it is very difficult to glean information from a subjective judgment such as creativity (Carson & Carson, 1993). Individuals who have a specific, difficult productivity goal (e.g., write a ten-page paper in three hours) receive feedback from the task itself to know how close they may be to attaining the goal. In contrast, individuals who are told to write a creative paper are not as easily able to gauge how close they may be to attaining the goal. Finally, creativity tasks are necessarily ambiguous and complex. Goal setting research has traditionally focused on relatively simple tasks or tasks that have clear means, which suggests the research may not perfectly translate to creativity tasks (Kanfer, Ackerman, Murtha, Dugdale, & Nelson, 1994; Mone & Shalley, 1995; Shalley, 1991).

Despite these differences between creativity and performance outcomes, goals may also be beneficial for creativity. Specifically, goals have been shown to encourage persistence, effort, and attention toward goal areas, and indirectly influence performance through effective task strategy (Locke, 1996; Locke & Latham, 2013). Given that creativity tasks are highly ambiguous and ill-defined, directing attention and encouraging task strategy becomes both relevant and important. How to set goals to enhance creative performance, however, is still unclear (Shalley & Koseoglu, 2013).

Having defined the creativity construct as consisting of two distinct but related criterion spaces, it seems logical to examine how interventions may be designed for the creative process and creative outcomes. Given that tasks requiring creativity are often ambiguous and characterized by unclear or ill-defined means and outcomes (George & Zhou, 2001; Mumford et al., 1991), directing attention toward effective strategies and relevant outcome criteria may enhance creative performance by reducing *unnecessary* ambiguity in both the creative process and the desired creative outcome. In other words, while some amount of ambiguity or “open-endedness” may be a necessary precondition for creativity and creative problem solving (Mumford et al., 1991), I argue that not all ambiguity will be helpful for creative performance. Indeed, ambiguity surrounding desirable characteristics of the outcome, relevant constraints, or helpful strategies may hinder creative performance.

The current research combines two streams of research that focus on interventions designed to direct attention toward the creative outcome and the creative process. The first stream of research examines creativity goals as an early contextual intervention. In brief, research on creativity goals has suggested that goals specifying that an outcome should be creative enhances creative performance by directing attention toward a relevant performance criterion (Harrington, 1975; O’Hara & Sternberg, 2000-2001; Shalley, 1991, 1995). The second stream of research implements interventions designed to direct attention toward various stages of the creative process. This vast literature on creative problem solving (Mumford & McIntosh, 2017) does not use the term goals to describe these interventions; however, the purpose of these interventions is to enhance creative performance by directing attention toward relevant strategies. Notably, the differential

impact of these two interventions has not been examined. To address this, the current research examines the unique influence of creativity goals and creative process goals. It is argued that creativity goals enhance creativity by directing attention toward relevant outcome criteria, and process goals enhance creativity indirectly by focusing attention toward creative process engagement or effective strategies for engaging in the creative process (see Figure 1).

### **Creativity Goals**

Whereas traditional goal setting aimed at performance outcomes directs attention toward a specific quantitative goal, creativity goals direct attention toward criteria important for creative outcomes – novelty and usefulness (Litchfield, Fan, & Brown, 2011; Madjar & Shalley, 2008). Past research has suggested that creativity requires deliberation and conscious choice (Ford, 1996; Unsworth & Clegg, 2010). That is, when deciding between a habitual action or creativity, the habitual action is favored because it is often more automatic, can rely on heuristics, is often less risky, and is likely to be better received by others (Ford, 1996; Sternberg & Lubart, 1991, 1996). Together, this suggests that creativity is not an unconscious default, and setting a creativity goal – a goal to be creative – should direct attention toward that goal area and away from habitual action (Shalley, 1995). In support of this idea, studies examining the influence of goals on creative outcomes have determined that the presence of a creativity goal (i.e., a goal to “be creative”) does increase creative performance (Carson & Carson, 1993; Litchfield et al., 2011; Shalley, 1991, 1995). Notably much of this past research relies on idea generation tasks which only represent one part of the creative process (e.g., Carson &

Carson, 1993; Litchfield et al., 2011) or measures creativity as unidimensional rather than a function of novelty and usefulness dimensions (e.g., Shalley, 1991, 1995).

*Hypothesis 1:* Creativity goals will result in higher levels of creative performance.

### **Process Goals**

Past research suggests that the creative process is an important precursor to creative performance, thus encouraging creative process engagement should result in higher levels of creative performance. How to *effectively* encourage creative process engagement is an important question, and one of central focus within the creative problem solving literature (Isaksen & Treffinger, 2004). Creative problem solving assumes that the creative process is inherently a problem solving process and can be studied just as any problem solving process. Moreover, the creative problem solving literature assumes that engaging in certain behaviors will yield higher levels of creative performance. In a series of studies, Mumford and colleagues supported this notion using instructions to encourage participants to engage in various stages of the creative process finding that these various stages were beneficial for creative performance (Mumford, Baughman, Maher, Costanza, & Supinski, 1997; Mumford, Baughman, Supinski, & Mahr, 1996; Mumford, Baughman, Threlfall, Supinski, & Costanza, 1996; Mumford et al., 1997; Mumford, Supinski, Threlfall, & Baughman, 1996).

Much of the past research on the creative process has focused on either individual stages of the creative process (e.g., problem definition; Reiter-Palmon et al., 1997) or examines the creative process as an outcome (e.g., idea generation; Rietzschel et al.,

2007). Thus, research remains limited on how the creative process as a whole relates to creative performance (cf., Medeiros et al., 2018; Mumford et al., 1997) and goal setting has not been directly applied to the creative process as it has with creative outcomes.

In past research, I found that process goals enhance creativity indirectly through creative process engagement (Keith & Jagacinski, 2019b). This finding is consistent with goal setting theory's proposition that goals may indirectly influence performance by encouraging relevant task strategies. Thus, I propose that process goals direct attention toward the process or the cognitive and behavioral stages that can be used to enhance creative outcomes (Baughman & Mumford, 1995; Mumford et al., 1991; Newell & Simon, 1972; Unsworth & Clegg, 2010).

*Hypothesis 2:* The relationship between process goals and creative performance will be mediated by creative process engagement.

### **Role of Goal Specificity**

Goal setting research argues that goals should be specific and difficult to enhance task performance (Locke & Latham, 1990, 2002, 2006). Importantly, goal difficulty and specificity potentially influence performance through different mechanisms. Given the importance of goal specificity for directing attention and effort, the current research focuses on this dimension rather than goal difficulty.

Specific goals for performance outcomes typically stipulate a specific numerical output (often ranging from easy to difficult) such as typing 30 words per minute. When setting goals for creativity, it is currently unclear how specific the goal should be. On one hand, goal specificity may reduce unnecessary ambiguity and complexity in a creativity

task thereby serving a directive function (Mumford, 2000). On the other hand, specific goals may focus attention too narrowly (Ordóñez, Schweitzer, Galinsky, & Bazerman, 2009), which may have negative implications for creativity (Friedman, Fishbach, Förster, & Werth, 2003; Kasof, 1997; cf. Liu & Peng, in press). For example, specific goals reduce focus on non-goal areas limiting exploration. Considering both possibilities, how specific goals impact creative performance may be complex and depend on how the goals direct attention. I argue that while specific creativity (outcome) goals are likely to be beneficial for creative performance, specific process goals may hinder creative performance.

General creativity goals are “do your best” goals that specify that an outcome should be creative. Specific creativity goals include the goal to be creative and numerical standards such as integrating three highly creative ideas. Creativity goals (whether general or specific) are likely to require greater effort and persistence, as they require foregoing what Ward (1994) referred to as ‘the path of least resistance’. That is, individuals tend to use passive approaches relying upon existing mental models to solve problems (Finke, Ward, & Smith, 1992). If, however, an outcome constraint, such as a creativity goal, is presented individuals are prevented from taking the path of least resistance and have to exert more cognitive effort to come up with an idea that is novel in addition to being useful. General creativity goals direct attention toward relevant criteria for creative performance; specific creativity goals that set both a quality goal (“be creative”) and a numerical goal (e.g., incorporate three highly creative ideas) direct attention towards relevant criteria while also adding numerical specificity increasing the effort extended. Thus, while general creativity goals are likely to result in higher levels of



creative performance than if no goal is set, a specific creativity goal is likely to require greater effort and have a stronger positive effect on creativity.

*Hypothesis 3a:* A specific creativity goal will result in higher levels of creative performance than no creativity goal.

*Hypothesis 3b:* A specific creativity goal will result in higher levels of creative performance than a general creativity goal.

*Hypothesis 3c:* A general creativity goal will result in higher levels of creative performance than no creativity goal.

With respect to the creative process, past research has produced equivocal findings with respect to structure resulting in two different perspectives (Sagiv, Arieli, Goldenberg, & Goldschmidt, 2010). On one hand, widely employed strategies such as brainstorming (Osborn, 1953) advocate for free association and no restriction on how ideas are generated. On the other hand, past research has argued that structure imposed through instructions may also result in creative outcomes (Rietzschel, Slijkhuis, & Van Yperen, 2014; Sagiv et al., 2010). For example, Sagiv and colleagues (2010) gave participants a specific set of instructions for generating ideas and found that structured idea generation resulted in ideas that were more original and creative than those generated in the no structure condition. Notably, research in this area, has primarily focused on idea generation rather than the creative process as a whole. Thus, understanding whether and how to structure the creative process has remained largely untested.

Keith and Jagacinski (2019b) assigned process goals that directed attention to the individual creative process behaviors and found that process goals did not have a direct positive effect on creative performance. It was speculated that the structure imposed by the process goals may be perceived as controlling with more controlling process goals being likely to have adverse impact on creative performance. To examine the role of structure (i.e., specificity) with creative process goals, the current research assigned both structured and semi-structured goals. The structured goals included a stronger manipulation of the process goals from Keith and Jagacinski (2019b) by emphasizing that the procedure should be completed in a specific order with the addition of numerical goals for the creative process (e.g., generate at least three ideas). The semi-structured process goals assigned goals for the creative process, but the behaviors could be performed in any order and no numerical goals were included. Past theory has suggested that the creative process may not be linear as is often depicted in models of the creative process (Mumford et al., 1991). As a result, specific goals for the creative process may need to provide structure without constraining the order in which individuals engage in the creative process. For this reason, semi-structured process goals may direct attention without controlling how individuals engage in the creative process, whereas the structured process goals will be more controlling and may interfere with creative performance by directing attention too narrowly.

*Hypothesis 4a:* Structured process goals will result in lower levels of creative performance than semi-structured process goals.

*Hypothesis 4b:* Structured process goals will result in lower levels of creative performance than no process goals.

*Hypothesis 4c:* Semi-structured process goals will result in higher levels of creative performance than no process goals.

### **Psychological Mechanisms**

An additional consideration is how specific goals will impact psychological mechanisms believed to be beneficial for creativity. The componential framework of creativity (Amabile, 1983, 1996) is among the most widely cited theories of creativity and forwards three components of creativity: domain relevant skills, creativity relevant skills, and task motivation. Task motivation in the context of this theory is conceptualized as intrinsic motivation. As a result, intrinsic motivation has received a great deal of attention in the creativity literature as a necessary (though not sufficient) precondition for creativity. Intrinsic motivation is theorized to enhance creativity by controlling attention on the task resulting in more effort and persistence (Zhang & Bartol, 2010a), as well as, by increasing positive affect, cognitive flexibility, and risk taking (Shalley, Zhou, & Oldham, 2004). In a recent meta-analysis, Liu, Jiang, Shalley, Keem, and Zhou (2016) examined the relationship between intrinsic motivation and creative outcomes. These authors found significant mean sample weighted correlations between intrinsic motivation and self-reports of creativity ( $r = .32$ ) and non-self-report measures of creativity ( $r = .25$ ).

Drawing from the literature on self-determination theory (Deci, 1975) and brainstorming (Osborn, 1953), Amabile (1983) also proposed that intrinsic task motivation would be influenced by the presence or absence of extrinsic constraints in the social environment. Although extrinsic constraints may manifest in a number of ways (e.g., evaluation, time pressure, external standards), much of the research on extrinsic

constraints and creativity has focused on how extrinsic rewards impact intrinsic motivation (Amabile, 1985; Amabile, Hill, Hennessey, & Tighe, 1994; Eisenberger & Aselage, 2009; Eisenberger & Cameron, 1998; Hennessey, 2000; Hennessey & Amabile, 1998). The current research, however, focuses on goals as extrinsic constraints. Indeed, the performance literature has argued that goals may also be construed as extrinsic constraints as they are externally imposed and constrain the outcome and process (Chang & Lorenzi, 1983; Mossholder, 1980).

Past research on extrinsic constraints has acknowledged that not all constraints will negatively impact intrinsic motivation (Caniëls & Rietzschel, 2015; Medeiros, Partlow, & Mumford, 2014; Medeiros, Watts, & Mumford, 2016). Specifically, whether extrinsic constraints impact intrinsic motivation will depend on whether they are viewed as controlling or informational (Deci, 1975; Deci & Ryan, 1980; Manderlink & Harackiewicz, 1984). Cognitive evaluation theory, a sub-theory of self-determination theory (Deci & Ryan, 1987) posits that external pressure that is perceived as controlling will negatively impact intrinsic motivation by reducing feelings of autonomy. Likewise, Roskes (2015) distinguished between limiting constraints and channeling constraints. Whereas limiting constraints (e.g., time pressure, dual-task demands) are predicted to have a negative impact on creativity due to limiting the cognitive resources available, channeling constraints (e.g., procedural instructions, goals) are predicted to have a positive impact on creative performance when they provide clarity and focus attention on the task. When one is presented with a problem, there is typically a large number of possible solutions (i.e., the solution space) and a large number of possible ways to get to that solution (i.e., the problem space; Cromwell, 2018; Newell & Simon, 1972). When

faced with a large number of possible solutions, individuals will often choose the default option – one that is unlikely to be creative (Iyengar & Lepper, 2000; Shafir, Simonson, & Tversky, 1993). Channeling constraints, then, help structure a problem and direct attention in a way that reduces the number of options or choices to make when solving the problem.

In the context of the current study, creativity goals are channeling constraints – they provide clarity and direct attention toward outcomes that are both novel and useful. Process goals are likely to have a more complex relationship with creative performance. Past research on autonomy suggests that individuals are likely to feel less autonomous when they do not have control over the methods used when engaging in a task (Reeve, Nix, & Hamm, 2003). Thus, I propose that while process goals may act as channeling constraints similar to creativity goals, they may also thwart one's need for autonomy by decreasing the control individuals have over how they engage in the creative process. Given the nature of goal specificity, this may be especially true for structured process goals. Early research drawing from the componential model of creativity (Amabile, 1988) supports this notion finding that external constraints, especially when perceived as controlling (i.e., overly structured) can be harmful for creativity (Koestner, Ryan, Bernieri, & Holt, 1984). Taken together, I argue that process goals will have a negative impact on autonomy and intrinsic motivation. Moreover, I predict that the relationship between process goals and creative performance will be mediated by autonomy and intrinsic motivation (see Figure 2).

*Hypothesis 5a:* Process goals will result in lower levels of self-reported autonomy.

*Hypothesis 5b:* Process goals will result in lower levels of self-reported intrinsic motivation.

*Hypothesis 6:* The relationship between process goals and creative performance will be serially mediated by autonomy and intrinsic motivation.

## METHOD

### Participants

Five hundred and eight seven Undergraduate students were recruited from a large Midwestern University to participate in this experiment. An a priori power analysis conducted for the ANOVA analyses indicated that a sample size of 251 would be appropriate to detect an effect size of .25 with an alpha of .05 and .95 level of power. However, with the inclusion of mediation hypotheses, I took a more conservative approach by increasing the number of participants based on Fritz and MacKinnon's (2007) recommendations for detecting mediating effects and determined that a sample size of 462 or more would allow for more power. Of the initial 587 participants, 25 participants were removed due to missing data and 2 participants were removed for spending too little time on the questionnaire items and invariant responding. The remaining 560 participants were included in the analyses ( $M_{\text{age}} = 18.88$ ,  $SD_{\text{age}} = 1.19$ ; 43.1% male; 62.9% White, 25% Asian or Pacific Islander). All participants received course credit for their participation.

### Design

The current study implemented a 3 (creativity goal: none, general, specific) x 3 (process goals: none, semi-structured, structured) between groups experimental design. All participants completed the experiment on a computer using a task programmed through Qualtrics. Creativity goals were manipulated in the task statement by giving participants the goal to either come up with plan (no creativity goal conditions), come up with a creative (original and practical) plan (general creativity goal conditions), or come

up with a creative (original and practical) plan integrating at least three highly creative ideas (specific creativity goal conditions).

Process goals were manipulated during the process phase of the task. Participants in the no process goal conditions were not given goals to engage in the creative process. Participants in the semi-structured and structured process goal conditions were given goals to engage in the creative process behaviors examined in this dissertation – problem definition, idea generation, and idea evaluation; however, how these goals were presented differed. In the semi-structured process goal conditions, participants were presented with these goals on the same page with open text boxes and told they could engage in the creative process behaviors in any order or not at all if they wished. In the structured process goal conditions, participants were presented with goals for problem definition, idea generation, and idea evaluation sequentially and were told they must complete the goals in a specified order. Structure was also imposed in the problem definition stage by specifying the number of ways the problem should be restated (at least three different ways), as well as, in the idea generation stage by giving the goal to come up with at least five [creative] ideas. The exact experimental manipulations can be found in Appendix C.

### **Procedure**

At the start of the study, participants were asked to give signed consent to participate in the study. After consenting, participants were directed to individual rooms with a desk and a computer. Participants were randomly assigned (using the Qualtrics software) into one of the nine conditions. Prior to being introduced to the task, participants were given a measure of Affect.



At the start of the experiment, participants were introduced to the following open-ended problem: “Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students volunteer either on campus or in the West Lafayette community; however, there are many needs in the community. The University has brought in a consultant (you) to help increase involvement in this area. Your goal is to come up with a plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.” This problem statement is similar to other problems presented in studies utilizing the creative problem-solving paradigm (e.g., Mumford et al., 1997; Reiter-Palmon & Arreola, 2015; Rietzschel et al., 2007). Additionally, we chose a problem that would likely be considered prosocial to increase the possibility of intrinsic interest in the problem, as recommended by research conducted by Grant and colleagues (e.g., Grant, 2008; Grant & Berry, 2011).

Notably, participants in different creativity goal conditions received slightly different versions of this task introduction. Participants in the no creativity goal conditions were given the prompt as presented above. Participants in the general creativity goal conditions, were told that their “goal is to come up with a creative (original and practical) plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.” Participants in the specific creativity goal conditions were told that their “goal is to come up with a creative (original and practical) plan integrating at least three highly creative ideas to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.”

After being introduced to the task, participants in all conditions were asked to report their initial impressions of the task. Specifically, participants were asked to give initial impressions of the task related to how interesting/enjoyable they thought the task would be, whether they were interested in completing the task, and how competent they felt about their ability to complete the task. These measures were included for exploratory purposes.

After completing these measures, participants in the semi-structured and structured process goal conditions were given goals to engage in three phases of the creative process: problem definition, idea generation, and idea evaluation. The problem definition goal asked participants to restate the problem in different ways (see Arreola & Reiter-Palmon, 2016 and Reiter-Palmon et al., 1997 for similar manipulations of problem definition). The idea generation goal asked participants to come up with ideas for solving the problem. Finally, the idea evaluation goal asked participants to evaluate the ideas generated during the idea generation phase. Participants not given process goals were not prompted to engage in the creative process. Rather, after being presented with the problem, participants were directed to the solution phase and asked to come up with a solution to the problem.

The content of these goals changed depending on whether a creativity goal was also present. Participants in the creativity goal conditions (whether general or specific) were told to generate creative ideas during idea generation and evaluate those ideas based on originality and practicality during idea evaluation. Participants in the no creativity goal conditions were simply told to come up with ideas with no mention of creativity

during idea generation and to evaluate their ideas based on how good the ideas were and how well they addressed the problem during idea evaluation.<sup>1</sup>

The structure and content of these goals also changed depending on whether the process goals were semi-structured or structured. Participants in the semi-structured process goal conditions were given instructions that read, “On this page you will find a number of strategies that have been used when solving [creative] problems. You may use these strategies to develop a plan if you would like and complete the strategies in any order.” Goals for problem definition, idea generation, and idea evaluation were given on the same page and participants were able to engage in the creative process flexibly. Participants in the structured process goal conditions were given the instructions, “Next we will walk you through stages for solving this [creative] problem. All stages must be completed as specified in the order given.” Participants were then given the process goals in order and had to complete one phase of the creative process before continuing to the next phase. During the problem definition phase, participants were given the goal to restate the problem in at least three different ways. During the idea generation phase, participants were given the goal to come up with at least five creative ideas. During the idea evaluation phase, participants were given the goal to rate each of their ideas generated during the previous phase on originality [goodness of idea] and practicality [addressing the problem].

During the next phase of the task, participants were asked to come up with a solution to the problem presented at the beginning of the experiment. Participants in the no creativity goal conditions were told, “Your goal is to come up with a plan to

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<sup>1</sup>These criteria were chosen for the no creativity goal conditions because they are consistent with criteria for regular problem solving rather than creative problem solving.

encourage students at Purdue to get involved in community service. In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.” Participants in the general creativity goal conditions were reminded that their goal was to come up with a creative (original and practical) plan, and participants in the specific creativity goal conditions were reminded that their goal was to come up with a creative (original and practical) plan integrating at least three highly creative ideas.

Following the experimental task, participants completed measures of creative process engagement, affect, autonomy, intrinsic motivation, perceptions of competence, openness to experience, and demographic items (e.g., age, sex, ethnicity). A complete list of items for these measures can be found in Appendix D. After the completion of the experiment all participants were debriefed and thanked for their participation.

## **Measures**

### **Creative Self-Efficacy**

Creative self-efficacy was measured prior to the study using three items developed by Tierney and Farmer (2002). A sample item is, “I have confidence in my ability to solve problems creatively.” Items are scaled from 1 (*very strongly disagree*) to 7 (*very strongly agree*). Creative self-efficacy was measured in an attempt to replicate past findings from previous research (i.e., Keith & Jagacinski, 2019b), but was not included in analyses for this study. This measure was given in pre-study measures collected at the start of the semester as part of a prescreen to prevent potentially priming participants with creativity prior to the manipulation, as well as, to separate the measure of creative self-efficacy in time from other measures.

### **Personal Need for Structure**

Personal need for structure was measured in the pre-study measures using a 12-item scale developed by Thompson, Naccarato, Parker, and Moskowitz (2001). The measure uses a 6-point scale ranging from 1 (*does not apply to me at all*) to 6 (*absolutely applies to me*). An example item is “It upsets me to go into a situation without knowing what I can expect from it.” This measure was included because past research has suggested that personal need for structure may influence how one reacts to a task that is structured versus unstructured (Rietzschel et al., 2014). I include this variable as a possible control variable and for exploratory purposes. The data for both creative self-efficacy and personal need for structure collected several weeks prior to this study and were linked to the experimental session data using the last five digits of the student’s identification number. Some of the identification numbers could not be linked to the pre-study identification numbers ( $n = 42$ ), so analyses including these variables could only be conducted on 518 participants.

### **Affect**

Positive and negative affect were measured at the state-level. Specifically, I utilized selected adjectives from the PANAS-X (Watson & Clark, 1994) to measure positive affect and negative affect. Positive affect items included confident, cheerful, happy, alert, and excited. Negative affect items included nervous, irritable, sad, tired, and jittery. These adjectives were chosen for their potential relevance during an experimental task. Participants were asked to indicate the degree to which they feel different emotions expressed in the PANAS-X currently on a 1 (*very slightly or not at all*) to 5 (*extremely*)

scale. Affect was measured as an exploratory variable prior to the manipulation and in the final questionnaire.

### **Intrinsic Motivation**

Intrinsic motivation was measured using two measures tapping into different aspects of intrinsic motivation. The first measure, behavioral inclination, was created for a previous study (Keith & Jagacinski, 2019a) to assess individual's behavioral intentions, or motivation to do the task if not required to do so (see Study 2 in Harackiewicz & Elliot, 1993). Behavioral inclination was included to ascertain whether participants would engage in the task in their free time, a common indicator of intrinsic motivation in self-determination theory (Deci & Ryan, 1987; Ryan, Koestner, & Deci, 1991). Items included "I would try this type of task again if I had the chance," "While working on the task, I felt like I was doing what I wanted to be doing," and "While working on the task, I felt like I would rather be doing something else" (reverse coded). Response options for these items ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). The second measure, interest/enjoyment, was taken from the intrinsic motivation inventory (<http://www.selfdeterminationtheory.org/>). The interest/enjoyment subscale includes seven items meant to assess how interesting and enjoyable the task was, such as "I enjoyed doing this activity very much." Behavioral inclination and interest/enjoyment were measured prior to engaging in the task and in the final questionnaire. Prior to engaging in the task, participants were given a shortened version of the two intrinsic motivation scales after being introduced to the problem. The items were reworded to be in the future tense (e.g., "I think I will enjoy doing this activity very much," "I would like to try this task."). The intermediate measures were included for exploratory purposes and

as possible controls. The responses to these measures were scaled from 1 (*not at all true*) to 7 (*very true*).

### **Perceived Competence**

Perceived competence was assessed prior to engaging in the task and in the final questionnaire using a subscale from the intrinsic motivation inventory. The perceived competence subscale includes six items meant to assess how competent the individual felt when completing the task, such as “After working at this activity for a while, I felt pretty competent.” Prior to engaging in the task, a shortened version was used, and items were rephrased to be in the future tense (e.g., “I think I will be pretty skilled at this activity”). The responses to these measures were scaled from 1 (*not at all true*) to 7 (*very true*). Perceived competence was measured as an exploratory variable.

### **Autonomy**

Autonomy was assessed in the final questionnaire using three items adapted from Breugh’s (1989) method autonomy scale. An example item is, “I was allowed to decide how to go about getting the task done (the methods to use).” These items are scaled 1 (*strongly disagree*) to 7 (*strongly agree*).

### **Creative Process Engagement**

Creative process engagement was measured in the final questionnaire as a manipulation check for the process goals and as a mediator of the effect of process goals on creative performance. To measure self-reported engagement with problem definition and idea generation, I adapted Zhang and Bartol’s (2010a) measure of creative process engagement to meet the needs of the current study. The adaptation primarily involved changing present tense verbs to past tense. For example, the item, “I generate a

significant number of alternatives to the same problem before I choose the final solution” was changed to be past tense - “I generated a significant number of alternatives to the problem before I chose the final solution.” A 5-point response scale was used (1 = *strongly disagree* to 5 = *strongly agree*).

Zhang and Bartol’s (2010a) original scale did not include items referring to idea evaluation. Given that idea evaluation is an important part of the creative process, three items were developed to measure idea evaluation. These items are as follows, “I incorporated numerous brainstormed ideas into the final solution,” “I evaluated the brainstormed ideas,” and “I considered the novelty and usefulness as criteria when evaluating the brainstormed ideas.” This measure of idea evaluation has been used in our past research (Keith & Jagacinski, 2019b). As with the creative process engagement items above, idea evaluation was assessed on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). These measures of problem definition, idea generation, and idea evaluation were averaged for a measure of creative process engagement.

### **Openness to Experience**

I utilized two subscales from Woo, Chernyshenko, Longley, Zhang, Chiu, and Stark’s (2014) openness to experience measure. The ingenuity subscale includes items such as, “I can develop inventive ideas of high quality,” and characterizes someone who is good at refining or creating something new. The curiosity subscale includes items such as, “I love to do experiments and see the results,” and characterizes someone who has a desire to learn, particularly about science and related topics. Both subscales are scaled from 1 (*strongly disagree*) to 5 (*strongly agree*). Openness to experience was measured in



the final questionnaire in an attempt to avoid priming creativity and to replicate past findings from previous research (i.e., Keith & Jagacinski, 2019b).

### **Novelty and Usefulness**

Each final solution was coded by four independent coders using the consensual assessment technique (Amabile, 1982). All coders were trained and remained blind to the experimental manipulations. Prior to rating any ideas, coders were introduced to the study materials (e.g., information given to participants, the task). Next, coders read through 150 ideas from the sample to familiarize themselves with common responses and to provide a reference for rating ideas. Then, coders rated a small number of randomized proposals for novelty. Discrepancies were discussed as in frame-of-reference training. After discussing discrepancies, coders rated a second small group of randomized proposals for novelty. After discussing any discrepancies, the coders rated all proposals for novelty on a scale from 1 (*not at all novel*) to 5 (*very novel*). After rating the proposals for novelty, the same training procedure was used for usefulness ratings. After training, coders rated all proposals for usefulness on a scale from 1 (*not at all useful*) to 5 (*very useful*). The proposals were randomized between and within coders to reduce the possibility of order effects. Rating also took place over the course of several weeks to prevent fatigue among coders.

Ratings of .60 or above for ICCs are considered acceptable for research purposes (Shrout & Fleiss, 1979). Interrater reliability for novelty ( $ICC(2) = .85$ ) and usefulness ( $ICC(2) = .79$ ) were acceptable, and ratings were averaged across the coders for the novelty and usefulness ratings used in the analyses.

**Creativity**

Creativity was calculated by multiplying novelty and usefulness ratings as recommended by past research (Simonton, 2012; Zhou & Oldham, 2001).

**Demographics**

Demographic characteristics were surveyed in the final questionnaire. The characteristics included sex, ethnicity, first language, age, class level, and major.

## RESULTS

Table 1 includes the zero-order correlations and reliabilities for study variables included in the analyses; Table 2 contains means and standard deviations by goal type for outcome variables; and Table 3 contains the means and standard deviations by condition for outcome variables.

### Preliminary Analyses

I examined the manipulation checks for the creativity goal and process goals as indicators that the experimental manipulations were effective. To check the creativity goal manipulation, participants were asked about their goal relating to the final solution: “My goal was to come up with a creative solution to the problem” (1 = *strongly disagree* to 7 = *strongly agree*). Only participants in the creativity goal conditions were asked to come up with a creative solution, so it was expected that endorsement of this item would be greater among those in the creativity goal conditions. A 3x3 ANOVA was conducted with creativity goal (none, general, specific) and process goal (none, semi-structured, structured) manipulations included as the independent variables and goal endorsements included as the dependent variable. Contrasts comparing the creativity goal conditions (general and specific) were also included to compare these conditions to the no creativity goal condition. The analyses indicated that the creativity goal manipulation was successful. A significant main effect was found for the creativity goal conditions with respect to the statement: “My goal was to come up with a creative solution to the problem” ( $F(2, 550) = 32.51, p < .001, \eta^2 = .05$ ). Simple contrasts revealed that, compared to the no creativity goal condition, participants were significantly more likely to report coming up with a creative solution as their goal when either a general creativity

goal ( $M = 5.22$  vs.  $4.74$ ,  $p = .001$ ) or a specific creativity goal ( $M = 5.57$  vs.  $4.74$ ,  $p < .001$ ) was given.

To examine the process goal manipulation check, I examined whether the process goal manipulation resulted in higher levels of creative process engagement. A 3x3 ANOVA was conducted with creativity goal (none, general, specific) and process goal (none, semi-structured, structured) manipulations included as the independent variables and creative process engagement as the dependent variable. A main effect was found for the process goal manipulation ( $F(2, 551) = 9.70$ ,  $p < .001$ ,  $\eta^2 = .03$ ) indicating that the manipulation was successful. Simple contrasts for the process goal manipulation revealed that, compared to the no process goal conditions, the semi-structured process goal manipulation ( $M = 3.34$  vs.  $3.12$ ,  $p = .001$ ) and the structured process goal manipulation ( $M = 3.38$  vs.  $3.12$ ,  $p < .001$ ) resulted in significantly more creative process engagement. The semi-structured process goal manipulation did not significantly differ from the structured process goal manipulation with respect to creative process engagement ( $M = 3.34$  vs.  $3.38$ ,  $p > .05$ ).

Finally, I examined possible differences between conditions with respect to the individual difference variables: openness to experience, creative self-efficacy, and personal need for structure. 3x3 ANOVAs with creativity goal and process goal manipulations as the independent variables and openness, creative self-efficacy, and personal need for structure as dependent variables found no significant main effects or interactions of the manipulations.

### Hypothesis Testing

Hypotheses 1 and 3 made predictions about how creativity goals as well as the specificity of these goals would impact creative performance. Hypothesis 1 predicted that creativity goals would result in higher levels of creative performance. This hypothesis was tested in 3 (creativity goal type: none, general, specific) x 3 (process goal type: none, semi-structured, structured) ANOVAs with novelty, usefulness, and creativity (novelty x usefulness) as dependent variables. In support of the first hypothesis, a significant main effect of creativity goal type was found for novelty ( $F(2, 551) = 23.29, p < .001, \eta^2 = .08$ ), usefulness ( $F(2, 551) = 20.71, p < .001, \eta^2 = .07$ ), and creativity ( $F(2, 551) = 37.91, p < .001, \eta^2 = .12$ ). A planned contrast comparing the two creativity goal conditions (specific and general) to the no creativity goal condition was conducted. Those given a creativity goal exhibited significantly higher levels of novelty ( $M = 2.75$  vs.  $2.35, t(558) = -4.60, p < .001, d = .42$ ) and creativity ( $M = 7.75$  vs.  $6.32, t(558) = -4.32, p < .001, d = .40$ ) than those not given a creativity goal. Moreover, the mean difference between those given a creativity goal and not given a creativity goal with respect for usefulness was marginally significant ( $M = 2.78$  vs.  $2.65, t(558) = -1.83, p = .07, d = .16$ ). Thus, Hypothesis 1 received support.

Hypotheses 3a-c predicted that a specific creativity goal would result in ideas higher in rated novelty, usefulness, and creativity than a) no creativity goal and b) a general creativity goal, and c) that a general creativity goal would result in higher novelty, usefulness, and creativity than no creativity goal. To test these hypotheses, I conducted simple contrasts for the creativity goal conditions. The results revealed that participants in the specific creativity goal condition had ideas rated higher in novelty ( $M$

= 3.00 vs. 2.35,  $p < .001$ ), usefulness ( $M = 3.02$  vs. 2.65,  $p < .001$ ), and creativity ( $M = 9.10$  vs. 6.32,  $p < .001$ ) than participants not given a creativity goal. Thus, Hypothesis 3a received full support. In support of Hypothesis 3b, participants in the specific creativity goal condition also had ideas rated higher in novelty ( $M = 3.00$  vs. 2.50,  $p < .001$ ), usefulness ( $M = 3.02$  vs. 2.53,  $p < .001$ ), and creativity ( $M = 9.10$  vs. 6.38,  $p < .001$ ) than the general creativity goal condition. Contrary to Hypothesis 3c, however, no significant differences were found with respect to novelty, usefulness, or creativity when comparing the general creativity goal condition and the no creativity goal condition.

To examine the effect sizes of these manipulations independent of the process goal manipulations, Hypothesis 3 was also examined with planned contrasts comparing the specific creativity goal/no process goals and general creativity goal/no process goals conditions to the control (no creativity goal/no process goal) condition. The results of these analyses were similar to those reported above. A general creativity goal did not result in higher levels of novelty ( $M = 2.49$  vs. 2.32,  $t(127) = -1.00$ ,  $p > .05$ ,  $d = .16$ ), usefulness ( $M = 2.59$  vs. 2.58,  $t(127) = -.04$ ,  $p > .05$ ,  $d = .01$ ), or creativity ( $M = 6.58$  vs. 5.90,  $t(127) = -1.13$ ,  $p > .05$ ,  $d = .20$ ). Conversely, a specific creativity goal resulted in significantly higher levels of novelty ( $M = 3.04$  vs. 2.32,  $t(127) = -4.50$ ,  $p > .001$ ,  $d = .33$ ), usefulness ( $M = 3.21$  vs. 2.58,  $t(127) = -4.43$ ,  $p > .001$ ,  $d = .78$ ), and creativity ( $M = 9.68$  vs. 5.90,  $t(127) = -6.79$ ,  $p < .001$ ,  $d = 1.19$ ). Taken together, Hypothesis 3 received partial support. While a specific creativity goal resulted in higher levels of rated creative performance than no creativity goal or a general creativity goal (H3a and H3b), a general creativity goal did not result in higher levels of creative performance than no creativity goal (H3c).

Hypothesis 2 predicted that the relationship between process goals and creative performance would be mediated by creative process engagement. This hypothesis was tested using the Process macro v.3.2.01 for SPSS (Hayes, 2018; Model 4). I requested 10,000 bootstrapped samples and controlled for other goal manipulations in all analyses. A process goal contrast comparing process goals (semi-structured and structured) to no process goals was included as the independent variable, creative process engagement as the mediator, and novelty, usefulness, and creativity as dependent variables in separate analyses. Control variables included two orthogonal contrasts to represent the creativity goal conditions and one contrast for the process goal conditions which compared the semi-structured condition to the structured condition which is orthogonal to the process goal contrast serving as the independent variable. Although the direct effects of the process goal contrast were not significant, significant indirect effects were found for novelty (Effect = .02, 95% CI [.0070, .0368]), usefulness (Effect = .02, 95% CI [.0059, .0274]), and creativity (Effect = .09, 95% CI [.0394, .1611]). Taken together, the second hypothesis received full support. The results of this analysis are summarized in Table 3.

Hypotheses 4a-c predicted that the structured process goal manipulation would result in lower levels of creative performance than a) semi-structured and b) no process goals, and c) that semi-structured process goals would result in higher levels of creative performance than no process goals. These hypotheses were tested in 3x3 ANOVAs with novelty, usefulness, and creativity as dependent variables. The main effect of process goal type was not statistically significant for novelty, usefulness, or creativity and simple contrasts revealed no significant mean differences between process goal conditions. Hypothesis 4 was also examined using planned contrasts comparing the structured

process goals/no creativity goal and semi-structured process goals/no creativity goal conditions to the control condition. Confirming the results of the first analysis, no significant mean differences were found in these comparisons. Hypotheses 4a-c did not receive support.

Hypotheses 5-6 examined the influence of process goals on autonomy and intrinsic motivation. Hypotheses 5a-b predicted that process goals, particularly structured process goals, would result in lower levels of autonomy (H5a) and intrinsic motivation (H5b). These hypotheses were tested using 3 (creativity goal type: none, general, specific) x 3 (process goal type: none, semi-structured, structured) ANOVAs with autonomy and intrinsic motivation as dependent variables. A significant main effect of the process goal manipulation on autonomy was found,  $F(2, 551) = 7.27, p = .001, \eta^2 = .03$ . Simple contrasts revealed that this main effect was driven by a significant mean difference between the semi-structured and structured process goal conditions and the no process goal condition. Specifically, individuals given structured process goals reported significantly less autonomy than individuals not given process goals ( $M = 5.81$  vs.  $6.20, p < .001$ ). Likewise, the semi-structured process goal condition reported significantly less autonomy than the no process goal condition ( $M = 5.98$  vs.  $6.20, p = .03$ ). No significant mean differences were found between the semi-structured process goal condition and the structured process goal condition ( $M = 5.98$  vs.  $5.81, p > .05$ ). With respect to intrinsic motivation, I included a measure for both interest and enjoyment and behavioral inclination. A main effect of process goals was not found for either of these two measures of intrinsic motivation. Thus, Hypothesis 5a received support, but Hypothesis 5b did not.



Although not hypothesized, a main effect of the creativity goal manipulation was also found with respect to autonomy,  $F(2, 551) = 4.17, p < .05, \eta^2 = .01$ . Contrasts indicated that individuals given general creativity goals reported significantly lower levels of autonomy than the no creativity goal condition ( $M = 5.87$  vs.  $6.16, p < .01$ ). No other contrasts reached the level of statistical significance, and the creativity goal manipulations did not impact either measure of intrinsic motivation.

Hypotheses 6 predicted that the relationship between process goals and creative performance would be serially mediated by autonomy and intrinsic motivation. This hypothesis was tested using the Process macro v.3.2.01 for SPSS (Hayes, 2018; Model 6). I requested 10,000 bootstrapped samples. A process goal contrast comparing the process goal conditions (semi-structured and structured) to the no process goal conditions was included as the independent variable, autonomy and intrinsic motivation as serial mediators, and novelty, usefulness, and creativity as dependent variables in separate analyses. Although two measures of intrinsic motivation were included in the study, only the measure of interest/enjoyment is included in these analyses given the more established use of this measure in the literature and the strong positive correlation between the two measures ( $r = .84, p < .01$ ). Control variables included two orthogonal contrasts to represent the creativity goal conditions and one contrast for the process goal conditions comparing the semi-structured conditions to the structured conditions. Results revealed that the process goal manipulation had a negative effect on autonomy ( $b = -.10, p < .001$ ) and that autonomy positively predicted interest/enjoyment ( $b = .24, p < .001$ ). Additionally, interest/enjoyment positively predicted novelty ( $b = .17, p < .001$ ), usefulness ( $b = .06, p < .05$ ), and creativity ( $b = .60, p < .001$ ). Serial mediation was

supported for novelty (Effect =  $-.004$ , 95% CI  $[-.0084, -.0015]$ ), usefulness (Effect =  $-.002$ , 95% CI  $[-.0043, -.0002]$ ), and creativity (Effect =  $-.004$ , 95% CI  $[-.0077, -.0014]$ ). These results support Hypothesis 6 and suggest that process goals may negatively impact creative performance by reducing perceptions of autonomy which in turn results in lower levels of intrinsic motivation and ultimately creative performance. Notably, these effects are small and should be interpreted with this in mind. The results of this analysis are summarized in Table 4.

To see which process goal manipulations are driving the effects, Hypothesis 6 was also tested with contrasts comparing 1) the structured process goal condition to the no process goal condition, 2) the semi-structured process goal condition to the no process goal condition, and 3) the structured process goal condition to the semi-structured process goal condition. All analyses followed the same procedures as above. First, a contrast comparing the structured process goal condition to the no process goal condition was included as the independent variable, autonomy and intrinsic motivation as serial mediators, and novelty, usefulness, and creativity as dependent variables in separate analyses. Control variables included two orthogonal contrasts to represent the creativity goal conditions and one contrast for the process goal manipulation that was orthogonal to the process goal contrast used in this analysis. Autonomy and intrinsic motivation serially mediated the relationship between structured process goals and novelty (Effect =  $-.01$ , 95% CI  $[-.0126, -.0024]$ ), usefulness (Effect =  $-.003$ , 95% CI  $[-.0064, -.0003]$ ), and creativity (Effect =  $-.03$ , 95% CI  $[-.0555, -.0100]$ ).

Next, a contrast comparing the semi-structured process goal conditions to the no process goal conditions was included as the independent variable, autonomy and intrinsic

motivation as serial mediators, and novelty, usefulness, and creativity as dependent variables in separate analyses. Control variables included two orthogonal contrasts to represent the creativity goal conditions and one contrast for the process goal manipulation that was orthogonal to the process goal contrast used in this analysis. Autonomy and intrinsic motivation serially mediated the relationship between semi-structured process goals and novelty (Effect = -.01, 95% CI [-.0108, -.0006]) and creativity (Effect = -.02, 95% CI [-.0375, -.0019]), but not usefulness (Effect = -.002, 95% CI [-.0043, .0000]).

Finally, a contrast comparing the semi-structured process goal conditions to the structured process goal conditions was included as the independent variable, autonomy and intrinsic motivation as serial mediators, and novelty, usefulness, and creativity as dependent variables in separate analyses. Control variables included two orthogonal contrasts to represent the creativity goal conditions and one contrast for the process goal manipulation that was orthogonal to the process goal contrast used in this analysis. Serial mediation was not supported for this set of analyses.

### **Supplemental Analyses**

#### **Do Creativity Goals Result in More Creative Process Engagement?**

To examine whether creativity goals may also result in higher levels of creative process engagement, I first ran 3x3 ANOVA with the goal manipulations as the independent variables and creative process engagement as the dependent variable. Analyses revealed that the creativity goal manipulation also resulted in higher levels of self-reported creative process engagement,  $F(2, 551) = 6.17, p < .01, \eta^2 = .02$ . Simple contrasts revealed that while a general creativity goal did not result in higher levels of creative process engagement than no creativity goal, a specific creativity goal resulted in

higher levels of creative process engagement than a general creativity ( $M = 3.40$  vs.  $3.19$ ,  $p = .001$ ) or no creativity goal ( $M = 3.40$  vs.  $3.23$ ,  $p = .01$ ). As might be expected, this main effect was qualified by a significant interaction between the creativity goal manipulation and the process goal manipulation,  $F(4, 551) = 2.65$ ,  $p < .05$ ,  $\eta^2 = .02$ . Pairwise comparisons revealed no significant differences between the creativity goal conditions with respect to creative process engagement when semi-structured or structured process goals were given; however, when no process goals were given, the specific creativity goal resulted in significantly more creative process engagement than the general creativity goal ( $M = 3.40$  vs.  $2.99$ ,  $p < .001$ ) and no creativity goal ( $M = 3.40$  vs.  $2.98$ ,  $p < .001$ ).

I also examined whether creative process engagement mediated the relationship between creativity goals and creative performance using the process macro (Hayes, 2018; Model 4) and following similar procedures as above. A creativity goal contrast comparing creativity goals (specific and general) to no creativity goal was included as the independent variable, creative process engagement as the mediator, and novelty, usefulness, and creativity as dependent variables in separate analyses. Control variables included two orthogonal contrasts to represent the process goal conditions and one contrast for the creativity goal conditions which compared the specific creativity goal condition to the general creativity goal condition which is orthogonal to the creativity goal contrast serving as the independent variable. Results did not indicate significant mediation in any of these analyses. Given the ANOVA results, I also conducted the same analysis using a contrast comparing the specific creativity goal condition to the no creativity goal condition. In addition to a significant direct effect found for the specific

creativity goal manipulation on novelty (Effect = .30, 95% CI [.2069, .4010]), usefulness (Effect = .17, 95% CI [.0933, .2495]), and creativity (Effect = 1.28, 95% CI [.9320, 1.6333]); significant indirect effects were also found for novelty (Effect = .02, 95% CI [.0056, .0433]), usefulness (Effect = .02, 95% CI [.0043, .0336]), and creativity (Effect = .11, 95% CI [.0298, .1990]).

Taken together, it appears that creativity goals – specific creativity goals in particular – may result in more creative performance and creative process engagement. Moreover, the relationship between specific creativity goals and creative performance is partially mediated by creative process engagement.

### **Do Autonomy and Intrinsic Motivation Mediate the Relationship Between Process Goals and Creative Process Engagement?**

This question was tested using the Process macro v.3.2.01 for SPSS (Hayes, 2018; Model 6). I requested 10,000 bootstrapped samples. A process goal contrast comparing the process goal conditions (semi-structured and structured) to the no process goal conditions was included as the independent variable, autonomy and intrinsic motivation as serial mediators, and creative process engagement as the dependent variable. Control variables included two orthogonal contrasts to represent the creativity goal conditions and one contrast for the process goal conditions comparing the semi-structured condition to the structured condition. Analyses indicated that while process goals have a positive direct effect on creative process engagement (Effect = .08, 95% CI [.0453, .1083]), process goals had a negative indirect effect on creative process engagement through autonomy and intrinsic motivation (Effect = -.01, 95% CI [-.0098, -.0020]).

I also included creative process engagement as a third serial mediator in the relationship between process goals and creative performance. Serial mediation was not found for novelty; however, autonomy, intrinsic motivation, and creative process engagement serially mediate the relationship between process goals and usefulness (Effect = -.001, 95% CI [-.0020, -.0002]) and creativity (Effect = -.004, 95% CI [-.0099, -.0010]). Notably, these analyses were exploratory, the effects are very small, and measures for autonomy, intrinsic motivation, and creative process engagement were taken at the same point in time. These findings should be interpreted with caution.

## DISCUSSION

Past research has suggested that creative outcome goals and creative process goals are effective contextual interventions for enhancing creative performance (Litchfield et al., 2011; Shalley, 1991, 1995). Yet, we still have much to learn about how to effectively set goals for creativity. In particular, goal setting research has long advocated for specific, difficult goals for enhancing performance outcomes (Locke & Latham, 1990, 2002, 2006). The implications of these goal dimensions, however, have not been adequately explored in the creativity context. The current research examined the goal specificity dimension with respect to outcome and process goals. It was expected that specific outcome goals direct attention more narrowly toward important criteria and would be beneficial to creative performance. Specific process goals, however, were not expected to be beneficial for creative performance, as such goals may direct attention away from important outcome criteria and may result in lower perceptions of autonomy. The impact of these goals on autonomy and intrinsic motivation were also examined, as these two psychological mechanisms have been cited as particularly important for effective creative performance. A summary of this study's findings can be found in Table 5.

The results of this research reveal that creative outcome goals and creative process goals are effective contextual interventions for enhancing creative performance. The nature of their relationship with creative performance, however, is distinctive. Creativity goals are aimed at creative outcomes and have a direct positive relationship with creative performance. In general, these results replicate previous findings from Keith and Jagacinski (2019b) as well as others (e.g., Litchfield et al., 2011; Shalley, 1991, 1995) finding that creativity goals direct attention toward criteria relevant for

successful creative performance. The current research extended this past research by also examining the potential influence of specific creativity goals that influence the content of the creative outcome. Findings revealed that specific creativity goals resulted in higher levels of creative performance compared to being assigned a general creativity goal or no creativity goal. Unlike in previous research, however, *general* creativity goals or goals to “be creative” did not result in higher levels of creative performance compared to no creativity goal. One possible explanation for this unexpected finding may be that general creativity goals resulted in lower perceptions of autonomy compared to the no creativity goals; whereas, specific creativity goals did not result in lower perceptions of autonomy compared to no creativity goals. A 3x3 ANCOVA controlling for autonomy was conducted to examine this potential. While controlling for autonomy did positively increase the mean difference between the general creativity goal and the no creativity goal condition, the simple contrast did not reach the level of significance. Thus, while autonomy may be one explanation for this finding there may be other relevant contextual or personal factors to consider. For example, Shalley (1991) found that general creativity goals were not more effective than no creativity goal except when a productivity goal was present or when personal discretion was low.

In contrast to creative outcome goals, process goals did not have a direct relationship with creative performance, but rather, influenced creative performance indirectly through creative process engagement. In other words, giving individuals process goals is most effective if they actively engage in the creative process. The finding supports the notion that goals may *indirectly* influence performance by encouraging effective task strategy (Locke, 1996; Locke & Latham, 2013). In the case of process



goals, these goals are directed at the creative process criterion space, which is concerned with task strategy rather than directly with outcome performance. Additionally, the goal setting literature suggests that goal acceptance and commitment are important for successful goal setting (Earley & Kanfer, 1985; Hollenbeck & Klein, 1987; Locke, Latham, & Erez, 1988). Individuals who report more creative process engagement are likely demonstrating some degree of goal acceptance and/or commitment. When individuals are given process goals, this goal must be accepted and acted upon for creative performance to result.

Finally, this research sheds light on how goals impact autonomy and intrinsic motivation in the creativity context. The importance of both of these psychological mechanisms has been argued throughout the creativity literature (Liu et al., 2016; Shalley et al., 2004), suggesting that goals may be less effective for creativity if they have a negative impact on autonomy and/or intrinsic motivation (Amabile, 1996). While this research does indicate that both process goals and creativity goals have a potentially negative impact on autonomy (particularly as specificity increases), autonomy still remains high on average ranging from 5.71 to 6.26 across conditions. As might be expected, individuals felt the most autonomous in the control condition with no creativity goal and no process goals as well as in the specific creativity goal condition with no process goals; individuals felt the least autonomous in the condition with a specific creativity goal and structured process goals. Notably, individuals also exhibited the lowest average levels of creativity in the control condition ( $M = 5.90$ ). Moreover, intrinsic motivation is not negatively impacted except indirectly via autonomy perceptions. This research also indicates that process goals and creativity goals may be

detrimental to creative performance when autonomy and intrinsic motivation are negatively impacted. A negative indirect effect of both process goals and creativity goals was found on creative performance through autonomy and intrinsic motivation. The effect sizes in these analyses are small, however, and there are strong positive direct effects of creativity goals that outweigh these small indirect effects. Conversely, process goals do not have a direct effect on creative performance and have a negative impact on perceptions of autonomy. Taken together, these analyses assuage some of the concern that autonomy and intrinsic motivation may be negatively impacted by setting goals for creative outcomes and processes.

### **Theoretical and Practical Implications**

The current research provides support for Montag et al.'s (2012) contention that creativity should be examined as two separate, but related criterion spaces – the creative process and creative outcomes. While process goals resulted in more creative process engagement, process goals do not have a direct relationship with creative performance. This finding replicates past research findings (i.e., Keith & Jagacinski, 2019b) and highlights a need to examine conditions under which the creative process contributes to creative outcomes.

Although a direct positive effect for process goals remains rather elusive, I found that assigning specific creativity goals had a great deal of utility relative to no goals or process goals alone. Indeed, the highest level of creative performance was found in the specific creativity goal/no process goal condition ( $M = 9.71$ ). The effect size of this condition compared to the control (no goals condition) is substantial ( $d = 1.20$ ) suggesting that directing additional attention and effort toward relevant outcome criteria

is efficacious. Additionally, the specific creativity goal condition also resulted in more creative process engagement. The means by condition (see Table 3) suggest that the specific creativity goal was at least as effective as assigning process goals. In combination, these findings demonstrate the utility of assigning specific creativity goals for increasing both creative process engagement and creative performance.

Importantly, this research extends past research on goals and creativity by examining how goal specificity/structure impacts creative performance. As predicted, specific creativity and process goals do not function in the same way. Though process goals had a negative impact on perceived autonomy regardless of their specificity, only general creativity goals negatively impacted autonomy in this study. It is unclear why general creativity goals negatively impacted autonomy while specific creativity goals did not; nonetheless, this may explain why general creativity goals did not result in higher levels of creative performance as would be expected from past research (e.g., Keith & Jagacinski, 2019b; Runco et al., 2005; Shalley, 1991, 1995).

Importantly, semi-structured and structured process goals did not exhibit meaningful differences in the analyses conducted. The finding sheds light on the previously perplexing finding from Keith and Jagacinski (2019b) that found a consistent null relationship between process goals and creative performance. Past research has suggested that the creative process may not be linear, and individuals may need to have the freedom to engage in the creative process in a less structured way (Mumford et al., 1991). In the current study, structured process goals constrained the order in which participants could engage in the different stages of the creative process and assigned numerical goals for engaging in these processes; semi-structured process goals allowed

participants to engage in the strategies in any order or even return to different stages without the numerical goals. The present research suggests that even when allowing participants to engage in the creative process in a less structured way, perceptions of autonomy are reduced, and individuals do not produce outcomes that are more creative compared to those given structured process goals or no process goals. One possible explanation may be that the creative process should be viewed more as descriptive than prescriptive. In other words, it is possible that while individuals often engage in the creative process in predictably similar patterns on average, prescribing everyone to do so may not be an effective way to enhance creativity. Another consideration is the possibility that not all creative process engagement is *effective* creative process engagement. That is, individuals who complete stages of the creative process may not be doing so purposefully – with the ultimate goal of coming up with a creative solution in mind. Likewise, individuals may not be doing so actively – only completing the stages passively. It is very likely that the nature of one's involvement – active vs. passive – will influence how effectively creative process engagement predicts creative performance. The current research lends some support to the notion that encouraging creative process engagement through goals may be effective but only when individuals are willing to engage in the creative process.

### **Limitations and Future Research Directions**

Any implications or conclusions drawn from this study should be considered in light of potential limitations of this research. One limitation is the possibility of common-method bias, as many of the variables were measured using self-reports at one point in time. Common method bias is more likely in the mediation analyses examining autonomy

and intrinsic motivation. Although I attempted to reduce this potential limitation with external ratings of novelty and usefulness, analyses including multiple self-reported variables should be interpreted with this limitation in mind.

Specific creativity goals were manipulated by specifying that the final solution should integrate at least three highly creative ideas. While the results suggested that this was an effective way to enhance creative performance and creative process engagement, there are other potential ways to manipulate specific creativity goals that were not tested. For example, a specific creativity goal may specify content areas that should be included in the final solution (e.g., include information about budget, incentives). Past research has suggested that setting specific creativity goals in this way may not be as effective because response option variability is constrained making the task less open-ended (Amabile, 1996; Shalley et al. 2004). Different goal specificity manipulations may have distinct impacts on autonomy or other psychological mechanisms. Given the results of this study, researchers should examine how to most effectively assign creativity process and outcome goals without thwarting autonomy.

Although not a limitation per se, few differences were found between semi-structured and structured process goals. It is possible that semi-structured process goals were still too structured to be effective for enhancing creativity. As noted previously, the creative process may not be linear as often depicted. Additionally, researchers have suggested the stages of the creative process may be more or less important for different tasks (Mumford & McIntosh, 2017; Mumford et al., 1991). For example, a problem that is more complex may require more extensive problem definition to evaluate the different

goals of the task. Future research is needed to better understand conditions under which the creative process does not result in creative performance.

The current research manipulated specificity dimensions of process goals and creativity goals but did not manipulate goal difficulty. To my knowledge there has been limited research on how goal difficulty impacts creative performance (cf., Shalley, 1991; Espedido & Searle, 2018). In one study, Espedido and Searle (2018) examined goal difficulty in two divergent thinking tasks and found that goal difficulty resulted in more fluency (i.e., generating more ideas) and more flexibility (e.g., generating ideas across categories). As previously mentioned, idea generation is not synonymous with creative performance, and it is unknown how these difficult productivity goals influenced creative outcomes because only the creative process criterion space was under investigation in this study. Shalley (1991) manipulated creativity goal difficulty by specifying that 90% of ideas generated in response to an in-basket exercise should be highly creative. Results of this study indicated that setting a difficult goal was more effective than no creativity goal but not more effective than setting a general (i.e., do your best) creativity goal. Moreover, these results only held under certain conditions – when personal discretion was low or when a productivity goal was present.

Although complexity is not synonymous with difficulty (Campbell, 1988), a number of studies have suggested that specific, difficult goals may be less effective for complex or novel tasks (Kanfer & Ackerman, 1989; Kanfer et al., 1994). Likewise, Amabile (1996) suggested that difficult goals may undermine intrinsic motivation. Difficulty may impact perceptions of competence resulting in lower levels of intrinsic motivation and thus creativity. Based on past research suggesting limitations of goal

setting theory in the context of complex or difficult tasks, goals high in difficulty may not be beneficial for creative tasks. Future research will be needed to tease apart the influence of both goal dimensions on creative performance.

### **Conclusion**

Past research has shown broad support for goals enhancing performance by increasing effort, persistence, and attention toward goal areas, yet research on goals and creative performance has received comparatively limited attention. The present study lends credence to the notion that goals can also benefit creative performance. Goals for creativity, however, are by necessity different in content and function than performance goals. This study extends current understanding of how goals influence creative process engagement, the role of specificity in setting goals for the creative process and creative outcomes, and how goals influence psychological mechanisms such as autonomy and intrinsic motivation. The findings suggest that goals can be effective for enhancing both creative process engagement and creative performance; however, care should be taken to ensure that goals do not negatively impact autonomy.

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APPENDIX A

Table 1  
*Correlations and Reliabilities for Study Variables*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Creativity Goal	—	—	—							
2. Process Goal	—	—	.01	—						
3. Autonomy	6.00	.99	-.10*	-.16**	(.91)					
4. Interest/Enjoyment	3.98	1.28	.04	.01	.18**	(.93)				
5. Behavioral Inclination	3.86	1.46	.01	.00	.20**	.84**	(.84)			
6. Creative Process Engagement	3.27	.62	.06	.17**	.14**	.47**	.44**	(.83)		
7. Novelty	2.62	1.00	.19**	.00	.06	.24**	.17**	.20**	(.85)	
8. Usefulness	2.74	.80	.08	-.05	.11**	.12**	.12**	.18**	.15**	(.79)
9. Creativity	7.28	3.75	.18**	-.02	.10*	.23**	.18**	.25**	.78**	.70**

*Note.* *N* = 560; Numbers on the diagonal represent coefficient alpha or ICC(2) for novelty and usefulness; Creativity Goal: 1 = yes, 0 = no;

Process Goal: 1 = yes, 0 = no; Creativity = Novelty x Usefulness.

\*  $p < .05$  \*\*  $p < .01$

Table 2

*Means and Standard Deviations by Goal Types*

	Process Goals			Creativity Goals		
	None <i>N</i> = 194	Semi-Structured <i>N</i> = 186	Structured <i>N</i> = 181	None <i>N</i> = 186	General <i>N</i> = 185	Specific <i>N</i> = 189
Novelty	2.61 (.98)	2.58 (1.03)	2.66 (.99)	2.35 (.91)	2.50 (1.08)	3.00 (.89)
Usefulness	2.80 (.86)	2.69 (.77)	2.71 (.77)	2.65 (.80)	2.53 (.73)	3.02 (.80)
Creativity	7.40 (3.74)	7.04 (3.61)	7.39 (3.89)	6.32 (3.38)	6.38 (3.48)	9.10 (3.69)
CPE	3.13 (.67)	3.33 (.58)	3.37 (.59)	3.23 (.61)	3.19 (.69)	3.40 (.54)
Autonomy	6.20 (.80)	5.98 (1.08)	5.81 (1.05)	6.16 (.93)	5.87 (1.09)	5.97 (.93)
Interest/Enjoyment	3.97 (1.27)	4.02 (1.34)	3.94 (1.23)	3.94 (1.30)	3.97 (1.26)	4.02 (1.27)
Behavioral Inclination	3.85 (1.41)	3.95 (1.53)	3.78 (1.44)	3.87 (1.49)	3.88 (1.45)	3.83 (1.45)

Table 3  
Means and Standard Deviations by Condition

Process Goals	Creativity Goal									
	No			General			Specific			
	No N = 65	Semi-Structured N = 62	Structured N = 59	No N = 64	Semi-Structured N = 62	Structured N = 59	No N = 64	Semi-Structured N = 62	Structured N = 63	
Novelty	2.32 (.95)	2.28 (.87)	2.44 (.92)	2.49 (1.02)	2.48 (1.13)	2.56 (1.10)	3.04 (.87)	2.93 (.93)	3.00 (.89)	
Usefulness	2.58 (.80)	2.66 (.77)	2.71 (.82)	2.59 (.79)	2.46 (.67)	2.51 (.74)	3.23 (.82)	2.93 (.84)	2.93 (.68)	
Creativity	5.90 (2.90)	6.21 (.30)	6.87 (3.85)	6.58 (3.83)	6.10 (3.14)	6.49 (3.50)	9.71 (3.41)	8.59 (3.75)	8.95 (3.89)	
CPE	2.98 (.62)	3.39 (.58)	3.31 (.62)	2.99 (.81)	3.24 (.61)	3.39 (.50)	3.40 (.50)	3.38 (.47)	3.42 (.65)	
Autonomy	6.23 (.78)	6.15 (1.04)	6.06 (.97)	6.13 (.90)	5.82 (1.23)	5.75 (1.07)	6.26 (.76)	5.88 (.96)	5.71 (1.04)	
Interest/Enjoyment	3.75 (1.36)	4.06 (1.32)	3.92 (1.23)	4.00 (1.27)	4.06 (1.30)	3.89 (1.19)	4.12 (1.15)	4.02 (1.38)	3.95 (1.31)	
Behavioral Inclination	3.75 (1.43)	3.93 (1.59)	3.87 (1.47)	3.90 (1.47)	4.04 (1.43)	3.71 (1.41)	3.89 (1.33)	3.94 (1.53)	3.72 (1.52)	

Table 4

*Effect of Process Goals on Creative Process Engagement and Creative Performance*

Outcome	Direct Effect of Process Goals <sup>1</sup>	Direct Effect of CPE	Indirect Effect Through CPE
Creative Process Engagement (CPE)	<b>.07 [.0368, .1076]</b>	—	—
Novelty	-.02 [-.0742, .0381]	<b>.27 [.1411, .4017]</b>	<b>.02 [.0070, .0368]</b>
Usefulness	<b>-.05 [-.0957, -.0053]</b>	<b>.21 [.1037, .3135]</b>	<b>.02 [.0059, .0274]</b>
Creativity	-.16 [-.3654, .0403]	<b>1.29 [.8208, 1.762]</b>	<b>.09 [.0394, .1611]</b>

*Note.* <sup>1</sup>Process goal contrast comparing process goals (semi-structured and structured) to no process goals; Creativity = Novelty x

Usefulness; all confidence intervals represent 95% confidence intervals; bolded numbers represent significant results; effects represent unstandardized coefficients.

Table 5  
*Effect of Process Goals on Autonomy, Intrinsic Motivation, and Creative Performance*

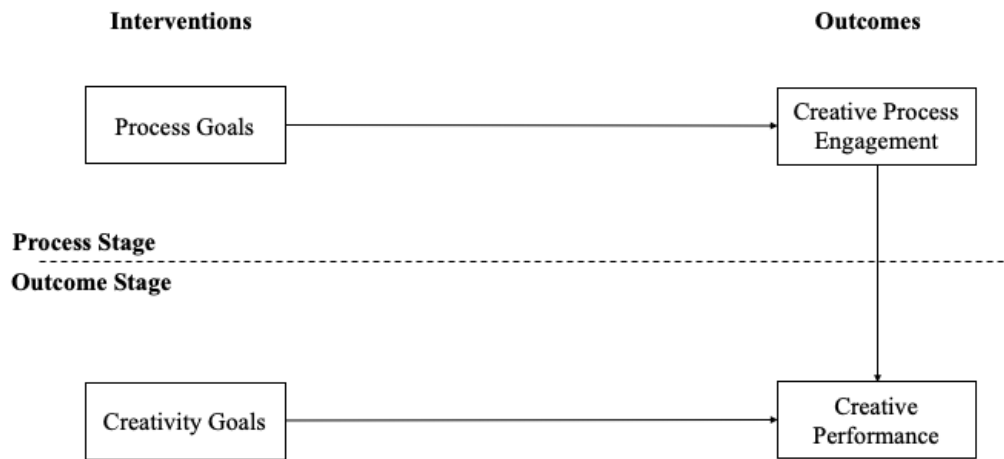
Outcome	Direct Effect of Process Goals <sup>1</sup>	Direct Effect of Autonomy	Direct Effect of Intrinsic Motivation	Serial Indirect Effect
Autonomy	<b>-.10 [-.1576, -.0439]</b>	—	—	—
Intrinsic Motivation	.03 [-.0452, .1031]	<b>.24 [.1368, .3520]</b>	—	—
Novelty	.00 [-.0509, .0596]	.04 [-.0464, .1166]	<b>.17 [.1121, .2363]</b>	<b>-.004 [-.0084, -.0015]</b>
Usefulness	-.03 [-.0739, .0166]	<b>.07 [.0030, .1366]</b>	<b>.06 [.0086, .1104]</b>	<b>-.002 [-.0043, -.0002]</b>
Creativity	-.05 [-.2477, .1553]	.26 [-.0421, .5527]	<b>.60 [.3761, .8293]</b>	<b>-.004 [-.0077, -.0014]</b>

*Note.* <sup>1</sup>Process goal contrast comparing process goals (semi-structured and structured) to no process goals; Creativity = Novelty x Usefulness; all confidence intervals represent 95% confidence intervals; bolded numbers represent significant results; effects represent unstandardized coefficients.

Table 6

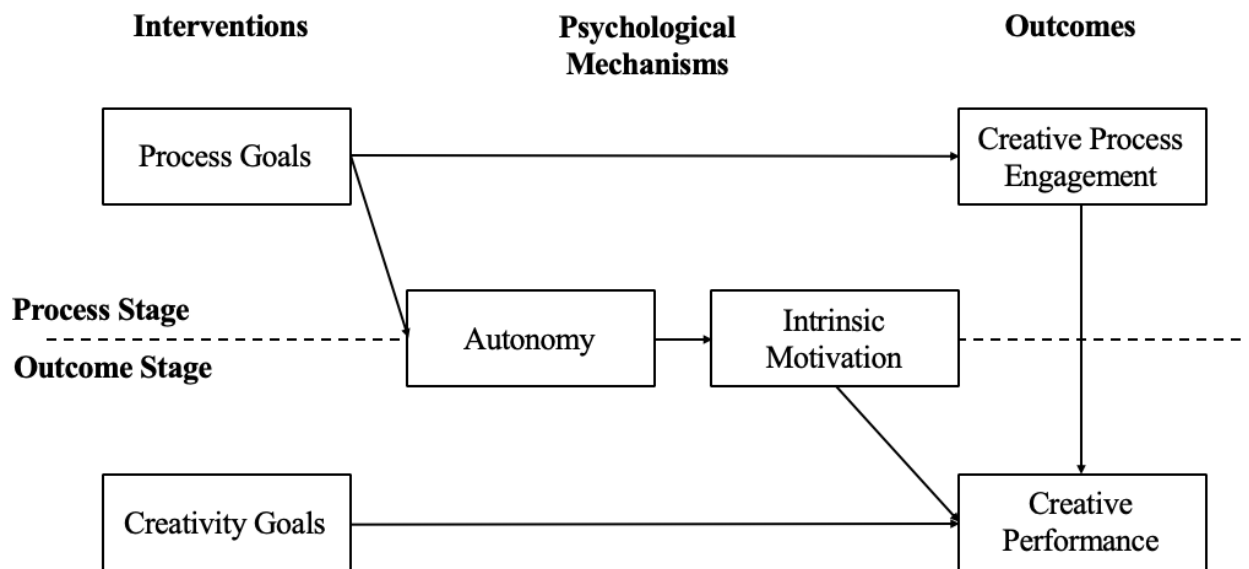
*Summary of Results*

	Hypothesis	Result
1	Creativity goals will result in higher levels of creative performance.	Supported
2	The relationship between process goals and creative performance will be mediated by creative process engagement.	Supported
3a	A specific creativity goal will result in higher levels of creative performance than no creativity goal.	Supported
3b	A specific creativity goals will result in higher levels of creative performance than a general creativity goal.	Supported
3c	A general creativity goal will result in higher levels of creative performance than no creativity goal.	Not Supported
4a	Structured process goals will result in lower levels of creative performance than semi-structured process goals.	Not Supported
4b	Structured process goals will result in lower levels of creative performance than no process goals.	Not Supported
4c	Semi-structured process goals will result in higher levels of creative performance than no process goals.	Not Supported
5a	Process goals will result in lower levels of self-reported autonomy.	Supported
5b	Process goals will result in lower levels of self-reported intrinsic motivation.	Not Supported
6	The relationship between process goals and creative performance will be serially mediated by autonomy and intrinsic motivation.	Supported

**APPENDIX B**

*Figure 1.* Model of goal interventions and predicted outcomes.





*Figure 2.* Model of goal interventions, psychological mechanisms, and predicted outcomes.

## APPENDIX C

CREATIVITY GOAL	PROCESS GOALS			
		none	semi-structured	structured
	no	1	2	3
	general	4	5	6
	specific	7	8	9

*No creativity goal:* Your goal is to come up with a plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

*General creativity goal:* Your goal is to come up with a **creative (original and practical)** plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

*Specific creativity goal:* Your goal is to come up with a **creative (original and practical)** plan integrating **at least three highly creative ideas** to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

*No process goals:* not instructed to engage in problem definition, idea generation, and idea evaluation

*Semi-structured process goals:* On this page you will find a number of strategies that have been shown to be helpful when solving [creative] problems. You may use these strategies to develop a plan if you would like and complete the strategies in any order.

Think about the problem you have been asked to solve. Restate the problem in your own words in as many ways as you can.

[Open text box]

Use the box below to generate [creative] ideas.

[Open text box]

Evaluate each of your brainstormed ideas. Keep in mind your goal is to come up with a [creative (original and practical)] plan for encouraging students at Purdue to get involved in community service.

[Open text box]

*Structured process goals:* Next, we will walk you through stages for solving this [creative] problem. **All stages must be completed as specified and in the order given.**

----- Page Break -----

Think about the problem you have been asked to solve. Restate the problem in your own words. **Your goal is to restate the problem in at least 3 different ways.**

----- Page Break -----

Use the blanks below to generate [creative] ideas. **Your goal is to come up with at least 5 [creative] ideas.**

----- Page Break -----

Evaluate each of your brainstormed ideas. **Your goal is to rate each of your brainstormed ideas on relevance [originality] and effectiveness [practicality].**

----- Page Break -----

**Condition 1: Control (no creativity goal, no process goals)**

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

Your goal is to come up with a plan to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.

[Open text box]

## Condition 2: no creativity goal, semi-structured process goals

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

On this page you will find a number of strategies that have been shown to be helpful when solving problems. You may use these strategies to develop a plan if you would like and complete the strategies in any order.

Think about the problem you have been asked to solve. Restate the problem in your own words in as many ways as you can.

[Open text box]

Use the box below to generate ideas.

[Open text box]

Evaluate each of your brainstormed ideas. Keep in mind your goal is to come up with a plan for encouraging students at Purdue to get involved in community service.

[Open text box]

----- Page Break -----

Your goal is to come up with a plan to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.

[Open text box]

### Condition 3: no creativity goal, structured process goals

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

Next, we will walk you through stages for solving this problem. **All stages must be completed as specified and in the order given.**

----- Page Break -----

Think about the problem you have been asked to solve. Restate the problem in your own words. **Your goal is to restate the problem in at least 3 different ways.**

----- Page Break -----

Use the blanks below to generate ideas. **Your goal is to come up with at least 5 ideas.**

----- Page Break -----

Evaluate each of your brainstormed ideas. **Your goal is to rate each of your brainstormed ideas on relevance and effectiveness.**

----- Page Break -----

Your goal is to come up with a plan to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.

[Open text box]

**Condition 4: general creativity goal, no process goals**

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a **creative (original and practical)** plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

Your goal is to come up with a **creative (original and practical) plan** to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.

[Open text box]

### Condition 5: general creativity goal, semi-structured process goal

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a **creative (original and practical)** plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

On this page you will find a number of strategies that have been shown to be helpful when solving creative problems. You may use these strategies to develop a plan if you would like and complete the strategies in any order.

Think about the problem you have been asked to solve. Restate the problem in your own words in as many ways as you can.

[Open text box]

Use the box below to generate ideas.

[Open text box]

Evaluate each of your brainstormed ideas. Keep in mind your goal is to come up with a **creative (original and practical)** plan for encouraging students at Purdue to get involved in community service.

[Open text box]

----- Page Break -----

Your goal is to come up with a **creative (original and practical) plan** to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.

[Open text box]



### Condition 6: general creativity goal, structured process goal

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a **creative (original and practical)** plan to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

Next, we will walk you through stages for solving this creative problem. **All stages must be completed as specified and in the order given.**

----- Page Break -----

Think about the problem you have been asked to solve. Restate the problem in your own words. **Your goal is to restate the problem in at least 3 different ways.**

----- Page Break -----

Use the blanks below to generate creative ideas. **Your goal is to come up with at least 5 creative ideas.**

----- Page Break -----

Evaluate each of your brainstormed ideas. **Your goal is to rate each of your brainstormed ideas on originality and practicality.**

----- Page Break -----

Your goal is to come up with a **creative (original and practical) plan** to encourage students at Purdue to get involved in community service.  
In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students.

[Open text box]

**Condition 7: specific creativity goal, no process goals**

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a **creative (original and practical) plan** integrating **at least three highly creative ideas** to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

Your goal is to come up with a **creative (original and practical) plan** with **at least three highly creative ideas** to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students. **Your plan should integrate at least three highly creative ideas.**

[Open text box]

### Condition 8: specific creativity goal, semi-structured process goals

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a **creative (original and practical)** plan integrating **at least three highly creative ideas** to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

On this page you will find a number of strategies that have been shown to be helpful when solving creative problems. You may use these strategies to develop a plan if you would like and complete the strategies in any order.

Think about the problem you have been asked to solve. Restate the problem in your own words in as many ways as you can.

[Open text box]

Use the box below to generate ideas.

[Open text box]

Evaluate each of your brainstormed ideas. Keep in mind your goal is to come up with a **creative (original and practical)** plan for encouraging students at Purdue to get involved in community service.

[Open text box]

----- Page Break -----

Your goal is to come up with a **creative (original and practical) plan** to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students. **Your plan should integrate at least three highly creative ideas.**

[Open text box]

### Condition 9: specific creativity goal, structured process goals

Purdue University has decided that they would like their undergraduate students to be more involved in community service. Currently only about 30% of the students at Purdue volunteer either on campus or in the West Lafayette community; however, there are many needs in the community.

The University has brought in a consultant (you) to help increase involvement in this area.

Your goal is to come up with a **creative (original and practical)** plan integrating **at least three highly creative ideas** to encourage students at Purdue to get involved in community service that could be presented to the Dean of Students.

----- Page Break -----

*Intermediate measures: Intrinsic Motivation, Perceptions of Competence (items randomized)*

----- Page Break -----

Next, we will walk you through stages for solving this creative problem. **All stages must be completed as specified and in the order given.**

----- Page Break -----

Think about the problem you have been asked to solve. Restate the problem in your own words. **Your goal is to restate the problem in at least 3 different ways.**

----- Page Break -----

Use the blanks below to generate ideas. **Your goal is to come up with at least 5 ideas.**

----- Page Break -----

Evaluate each of your brainstormed ideas. **Your goal is to rate each of your brainstormed ideas on originality and practicality.**

----- Page Break -----

Your goal is to come up with a **creative (original and practical) plan** to encourage students at Purdue to get involved in community service.

In the space below, please offer a plan for achieving this goal that could be presented to the Dean of Students. **Your plan should integrate at least three highly creative ideas.**

[Open text box]

## APPENDIX D

### List of Study Measures

#### Creative Self-Efficacy

1 = very strongly disagree; 3 = neutral; 7 = very strongly agree

Please indicate your level of agreement with the following statements:

1. I have confidence in my ability to solve problems creatively.
2. I feel that I am good at generating novel ideas.
3. I am good at elaborating on and improving upon other's ideas.

#### Personal Need for Structure

6-point scale ranging from 1 (*does not apply to me at all*) to 6 (*absolutely applies to me*)  
Items 2, 5, 6, and 11 are reverse scored; Personal Need for Structure = the average of these 12 items

Please indicate your level of agreement with the following statements:

1. It upsets me to go into a situation without knowing what I can expect from it.
2. I'm not bothered by things that upset my daily routine.
3. I enjoy having a clear and structured mode of life.
4. I like a place for everything and everything in its place.
5. I like being spontaneous.
6. I find that a well ordered life with regular hours makes my life tedious.
7. I don't like situations that are uncertain.
8. I hate to change my plans at the last minute.
9. I hate to be with people that are unpredictable.
10. I find that a consistent routine enables me to enjoy life more.
11. I enjoy the exhilaration of being put in unpredictable situations.
12. I become uncomfortable when the rules in a situation are not clear.

#### PANAS-X (Watson & Clark, 1994)

This scale consists of a number of words and phrases that describe different feelings and emotions. Indicate to what extent you currently feel this way:

1 (very slightly or not at all) to 5 (extremely)

*Negative Affect:* nervous, irritable, sad, tired, jittery

*Positive Affect:* confident, cheerful, happy, alert, enthusiastic

**(Adapted from) Creative Process Engagement (Zhang & Bartol, 2010a)**

Reflecting on the previous task, to what extent did you engage in the following actions when seeking to accomplish the task and solve the problem? (1=strongly disagree to 5=strongly agree)

*Problem Identification*

1. I spent considerable time trying to understand the nature of the problem.
2. I thought about the problem from multiple perspectives.
3. I decomposed the difficult problem/task into parts to obtain greater understanding.

*Idea generation*

1. I considered diverse sources of information in generating new ideas.
2. I looked for connections with solutions used in seeming diverse areas.
3. I generated a significant number of alternatives to the same problem before I chose the final solution.
4. I tried to devise potential solutions that move away from established ways of doing things.

*Idea Evaluation (Items created for the purposes of this study)*

1. I incorporated numerous brainstormed ideas into the final solution.
2. I evaluated the brainstormed ideas.
3. I considered the novelty and usefulness as criteria when evaluating the brainstormed ideas.

**Work Autonomy Scales (Breugh, 1989)**

Scaled 1(strongly disagree) to 7 (strongly agree)

*Three items adapted for the purposes of this study*

1. I was allowed to decide how to go about getting the task done (the methods to use).
2. I was able to choose the way to go about the task (the procedures to utilize).
3. I was free to choose the method(s) to use in carrying out the task.

**Intrinsic Motivation/Competence (intermediate measure)**

7-point scale ranging from 1 (*not at all true*) to 7 (*very much true*)

1. I will enjoy doing this activity.
2. This activity will be fun to do.
3. I think this will be a boring activity.
4. I would describe this activity as very interesting.
5. I think I will be pretty good at this activity.
6. I think I will do pretty well on this activity, compared to other students.
7. This is an activity I won't be able to do very well.
8. I would like to try this task.
9. I would rather do another task.

### **Intrinsic Motivation Inventory (Self Determination Theory website)**

All three subscales are on a scale 1 (*not at all true*) to 7 (*very true*).

#### *Interest/ Enjoyment*

1. I enjoyed doing this activity very much.
2. This activity was fun to do.
3. I thought this was a boring activity.
4. This activity did not hold my attention at all.
5. I would describe this activity as very interesting.
6. I though this activity was quite enjoyable.
7. While I was doing this activity, I was thinking about how much I enjoyed it.

#### *Perceived Competence*

1. I think I am pretty good at this activity.
2. I think I did pretty well at this activity, compared to other students.
3. After working at this activity for awhile, I felt pretty competent.
4. I am satisfied with my performance at this task.
5. I was pretty skilled at this activity.
6. This was an activity that I couldn't do very well.

### **Behavioral Inclination (Harackiewicz & Elliot, 1993)**

5-point scale from 1 (*not at all true*) to 7 (*very true*)

1. I would try this type of task again if I had the chance.
2. While working on the task, I felt like I was doing what I wanted to be doing.
3. While working on the task, I felt like I would rather be doing something else.

### **Openness to Experience (Woo, Chernyshenko, Longley, Zhang, Chiu, & Stark, 2014)**

Items 1, 2, 5, and 8 from Ingenuity subscale are reverse scored; Items 1, 7, and 8 from the Curiosity subscale are reverse scored

On a scale of 1 (strongly disagree) to 5 (strongly agree), please indicate how well each of the following sentences describes you.

#### *Ingenuity*

1. I rarely take an idea and apply it in a new way.
2. Compared to other people I don't think I am very creative.
3. I like coming up with imaginative plans.
4. I improvise if I don't have the right tool for a job.
5. I avoid situations where I might have to come up with something new.
6. I would rather have a job that involves creativity than one that doesn't.
7. People come to me if they are stuck for fresh ideas.
8. I'm hopeless with inventing new things.
9. I can develop inventive ideas of high quality.

*Curiosity*

1. I have never really been interested in science.
2. I try to learn something new every day.
3. I have no interest in learning new information.
4. I love to do experiments and see the results.
5. I continually strive to uncover information about topics that are new to me.
6. In a quiz I like to know what the answers are if I get the questions wrong.
7. I don't like trying new things and would rather stick with what I know.
8. I seldom seek new opportunities to extend my knowledge.
9. I like to analyze things instead of taking them at face value.