Intrinsic motivation and innovative work behavior revisited: Reciprocal relationships at different stages of the innovation process

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Dear reader, consider for a minute that this is not the first page of an academic dissertation, but that you are about to read a story. Like any other story, in order to fully understand the plot, it is important that you know who the main characters are. After all, this is not a one-man accomplishment but there are several people that should be acknowledged as they all have helped me, in their own unique ways, to bring this challenging endeavor to a good end. However, for the sake of honesty, I must admit that a natural interest in organizational psychology and innovation processes at work might be to your advantage if you are looking for a pleasant and exciting read. That being said, I am already grateful you have made the effort to open my dissertation as you are probably curious whether your name has made it into the acknowledgments below.

From the moment you start as a Ph.D. student, it does not take too long before you hear about these horror stories of impossible and rigid supervisors who systematically exploit their students and are just too self-centered to invest in the careers of others. I honestly can say that if other academics were to follow the example of my promotor Frederik Anseel, these urban legends would have no reason of existence anymore. Frederik, it has truly been a privilege to work with you over the years. Indeed, I am intentionally saying “to work with you” and not “to work for you”. From day one you have treated me, despite my inexperience and ignorance, as a colleague whose opinion and ideas you respected and appreciated. Needless to say that your expertise, constructive attitude, and trust have provided the fundamentals on which this dissertation has been built. You will remain a role model during my entire career and I am confident that you will inspire and enthuse many more Ph.D. students with your trademark supportive mentoring style.

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Eight months ago, my mother passed away which has been a devastating period in my life. As I am writing down my words of gratitude, I am also reflecting on her artistic personality and sense of elegance, her courage and legendary fighting spirit. These are values that will be a life-long inspiration to me. So, allow me to end with something my mother would often tell me, even (and perhaps especially) when she was in a difficult place herself.

"Haal voldoening uit wat je doet, durf ervoor te gaan, en vergeet het niet: A D M."

“Alle Dagen Mooi.”

Toon Devloo, Ghent, December 2013
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter 1: General Introduction</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>The People Side of Innovation</td>
<td>3</td>
</tr>
<tr>
<td>Challenges for Current Research</td>
<td>7</td>
</tr>
<tr>
<td>The Present Dissertation</td>
<td>12</td>
</tr>
<tr>
<td>References</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 2: Keep the Fire Burning: Reciprocal Gains of Basic Need Satisfaction, Intrinsic Motivation and Innovative Work Behavior</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>24</td>
</tr>
<tr>
<td>Motivational Drivers of Individual Innovation</td>
<td>26</td>
</tr>
<tr>
<td>Reciprocal Gains of Intrinsic Motivation and Innovative Work Behavior</td>
<td>28</td>
</tr>
<tr>
<td>Method</td>
<td>31</td>
</tr>
<tr>
<td>Results</td>
<td>36</td>
</tr>
<tr>
<td>Discussion</td>
<td>39</td>
</tr>
<tr>
<td>References</td>
<td>43</td>
</tr>
<tr>
<td>Footnotes</td>
<td>49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>54</td>
</tr>
<tr>
<td>The Motivational Potential of Innovative Work Behavior</td>
<td>56</td>
</tr>
<tr>
<td>The Moderating Role of Perceived Success</td>
<td>59</td>
</tr>
<tr>
<td>The Moderating Role of Support For Innovation</td>
<td>61</td>
</tr>
<tr>
<td>Method</td>
<td>62</td>
</tr>
<tr>
<td>Results</td>
<td>66</td>
</tr>
<tr>
<td>Discussion</td>
<td>71</td>
</tr>
<tr>
<td>References</td>
<td>75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4: When Creative Self-Efficacy Makes the Difference: A Within-Person Approach on the Pursuit of Radical and Incremental Ideas</th>
<th>81</th>
</tr>
</thead>
</table>
CHAPTER 1

GENERAL INTRODUCTION

ABSTRACT
In today’s rapidly changing and challenging work environments, creativity and innovation are highlighted as core competences for professionals of all types. During the last three decades, much research attention has been devoted to the motivational underpinnings of creative and innovative processes at work. Despite a wealth of research on this topic, the nature of motivational processes has turned into a matter of heated debate in recent innovation literature. In this first chapter, a number of theoretical and methodological concerns are discussed with regards to previous research that has focused on the relationship between motivation, creativity, and innovation. These concerns have been grouped into four specific research challenges for innovation literature which will serve as a general outline for the primary objectives of the present dissertation. This general introduction ends with an overview of the empirical studies included.
INTRODUCTION

Due to the financial crisis that escalated near the end of 2008, the world economy suddenly found itself on the brink of collapse. During this economic fallout of arguably the biggest recession ever experienced, lives of billions of people were radically affected. Around the world, governments fell apart, organizations had to file for bankruptcy and millions of employees lost their job overnight. Ironically, this drama of enormous proportions also marked the beginning of an ‘innovation fever’ that would quickly spread across corporate Europe to revive the failing economy. In the subsequent years, drastic measures would be taken by governments to stimulate the innovative activities of organizations, universities and research institutions in an attempt to fight the recession and to damp down the fear of another financial meltdown.

It is not that uncommon for governments to promote innovation when trying to restore the economy. In this regard, organizational creativity and innovation are considered necessary to remain competitive within the global economy, especially in times of crisis (Baer & Frese, 2003). For example, in 2010 the Flemish government decided to gradually allocate more financial resources for science and innovation, which resulted in a 14% increase of the annual budget for research and development in 2013. This is quite impressive, especially considering that in 2009 this budget was actually cut by 1,5% (Debackere & Veugelers, 2013).

Consequently, the growing awareness among politicians and practitioners for the need to innovate has also led to a more systematic and complete approach on how innovation processes should be organized in industrial settings. Whereas innovation used to be exclusively regarded as a technological matter for R&D professionals, today there is a tendency to also incorporate organizational and managerial factors when fostering innovation. Indeed, products and services that are brought to the market, all originate from an idea that has been productively elaborated by people throughout several stages of an innovation process. Furthermore, as innovation comes hand in hand with a high extent of uncertainty and often undermines basic routines that employees have adopted across several years, ‘the people side’ of innovation processes seems an indispensable factor to take into account when pursuing
innovative success (Janssen & Huang, 2008; Scott & Bruce, 1994; Yuan & Woodman, 2010). Hence, considering the central role attributed to employees for organizational survival and success, it has become crucial for practitioners to develop efficient strategies to facilitate and encourage employee creativity and innovation.

THE PEOPLE SIDE OF INNOVATION

The relatively recent interest of organizations in the psycho-social drivers of innovation in the workplace starkly contrasts against the substantial body of research on employee creativity and innovation that has been accumulating over the past three decades. This extensive stream of organizational research has produced valuable insights regarding the facilitators and inhibitors of creativity and innovation at the individual, team, and organizational level (for reviews, see Anderson, De Dreu, & Nijstad, 2004; Bledow, Frese, Anderson, Miriam, & Farr, 2009; Hülsheger, Anderson, & Salgado, 2009).

So far, I have interchangeably used the terms creativity and innovation to refer to those activities that are associated with the development and elaboration of ideas in the workplace. However, it is necessary to further establish what is exactly meant by both terms as they have been positioned in the literature as related but distinct concepts.

DEFINING CREATIVITY AND INNOVATION

In line with previous theory and research, creativity can be described as the production of novel and useful ideas by an individual or small group of individuals (Amabile, 1988, p. 126). For what concerns workplace innovation, undoubtedly the most referenced and generally accepted definition has been provided by West and Farr (1990). They defined innovation as:

“the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organization or wider society” (p. 9).
Hence, by definition creativity is different from innovation in that the former involves the generation of ideas whereas the latter encompasses both the proposal and implementation of ideas (Zhou, 2003). A further difference is that creativity comprises ideas that are truly novel, whereas innovation can be based on ideas that may already exist in different contexts or are adopted from previous experiences (Rank, Pace, & Frese, 2004).

As ideas are the foundation of all innovative improvement, creativity usually provides a starting point for eventual innovation (Scott & Bruce, 1994). In a similar vein, psychological scientists and innovation researchers often use insights from creativity research as a building block to develop theoretical models concerning the drivers of innovation. In this light, it is interesting to note that in virtually all theories of creativity and innovation, motivational components are integrated as a key factor to maximize the innovative potential of individuals. In fact, creative and innovative behavior has been argued to be largely a motivational issue (Amabile, 1988; Ng, Feldman, & Lam, 2010; Pieterse & Knippenberg, 2010). In this regard, several reviews of the extensive research highlighting the crucial role of motivation for creativity and innovation are available (e.g., Anderson et al., 2004; Bledow et al., 2009; Byron & Khazanchi, 2012; De Dreu, Nijstad, Bechtoldt, & Baas, 2011; Hammond, Neff, Farr, Schwall, & Zhao, 2011; Hülsheger et al., 2009; Janssen, Van De Vliert, & West, 2004; Paulus & Nijstad, 2003; Shalley & Gilson, 2004; Shalley, Zhou, & Oldham, 2004; West, 2002; Zhou & Shalley, 2008).

**Motivational Underpinnings of Innovation**

Since the ‘intrinsic motivation perspective’ has been introduced in the creativity literature by Teresa Amabile (e.g., Amabile, 1979, 1982, 1983), a pioneer in this research field, the relationship between the motivational orientation of individuals and creative outcomes has become a topic prompting much research. Intrinsic motivation refers to the extent to which an individual is excited about a work activity and engages in it for the sake of the activity itself (Shalley et al., 2004). This motivational perspective originates from self-determination theory which posits that performance is strongly affected by one’s inherent interest in tasks and activities (Ryan & Deci, 2000). Amabile (1985)
argued that intrinsic motivation is particularly relevant for the creative performance of individuals. Intrinsically motivated individuals are assumed to be more creative as such type of motivation increases their tendency to be curious, cognitively flexible, risk taking, and persistent in the face of barriers (Grant & Berry, 2011; Utman, 1997; Zhou, 1998). In contrast, individuals who are not driven by the love for the activities itself but are more motivated by external rewards like acknowledgement, status or salary would appear to be less creative in their job (Amabile, Hill, Hennessey, & Tighe, 1994; Amabile, 1988; Collins & Amabile, 1999). This is because extrinsically motivated individuals tend to focus on the rewards rather than on the task itself (Amabile, 1996). Consequently, these individuals are expected to pay less attention to creativity-relevant aspects of the task and will be less likely to exhibit cognitive flexibility that could help them to approach their task in new and more original ways (Cooper & Jayatilaka, 2006). Inspired by the relationship between intrinsic motivation and creativity, innovation researchers have adopted this motivational perspective in order to explain the positive effects of several individual and contextual determinants of innovation in the workplace (e.g., Hammond et al., 2011; Janssen & Van Yperen, 2004; Knol & Van Linge, 2009; Schuhmacher & Kuester, 2012; Shalley, Zhou, & Oldham, 2004). As a result, the intrinsic motivation perspective has emerged as one of the most influential theoretical frameworks guiding innovation research.

The positive impact of intrinsic motivation on innovative activities has been demonstrated across different settings and situations. For example, with a focus on new product development, Burroughs and colleagues (2011) showed that intrinsic motivation positively affects the originality and importance of generated ideas. Chang, Hsu, Liou, and Tsai (2013) found among a sample of development engineers, that the influence of psychological contracts on innovative work behavior could be explained by increased levels of motivation (i.e., work engagement). In this regard, intrinsic motivation has been described as a crucial motivational state for engineers, especially when they move into roles where greater importance is placed on self-determination activities in product innovation (Williamson, Lounsbury, & Han, 2013). With a focus on
crowd sourcing activities, Kratzer and Lettl (2008) found that lead users were more likely to participate in innovation activities (e.g., providing appropriate solutions and improvements concerning prototypes and first-generation products) when they experienced high levels of intrinsic motivation. Furthermore, intrinsic forms of motivation were also found to predict innovative performance of non-R&D workers such as school teachers (Singh & Sarkar, 2012) and healthcare workers (Hakanen, Perhoniemi, & Toppinen Tanner, 2008; Knol & Van Linge, 2009).

Despite the popularity of this intrinsic motivation perspective, the nature of motivational processes has turned into a matter of heated debate in the innovation literature. For example, innovation research has focused heavily on cross-sectional designs which do not allow a deeper understanding of how the relationship between intrinsic motivation and innovative behaviors take shape over time. Given that innovation is a risky endeavor, it can be assumed that engaging in innovative activities can bring benefits but also costs for employees which might lead to fluctuations in the experience of motivation during an innovation process (Janssen et al., 2004; Yuan & Woodman, 2010). Furthermore, although rewards have been argued to undermine intrinsic motivation, research on the reward-creativity and innovation relationship has been inconsistent (Amabile et al., 1994; Baer, Oldham, & Cummings, 2003; Collins & Amabile, 1999; Eisenberger & Aselage, 2009; Eisenberger & Cameron, 1998). This suggests that reward expectancies may boost one’s motivation levels in some circumstances, whereas these expectancies diminish one’s motivation in others.

Given that our current understanding of the motivation-innovation relationship is mainly based on theoretical assumptions that were established in the previous century, it is not very surprising that scholars increasingly call for more research in this domain. In this regard, George (2007, p. 445) posited the following: “rather than assume that intrinsic motivation underlies creativity, researchers need to tackle this theorized linkage more directly and in more depth.” Hence, this inevitably leads us to the question how innovative the creativity and innovation literature really has become in recent years and which challenges should be met to substantially advance the field.
CHALLENGES FOR CURRENT RESEARCH

In this section, I will provide an overview of several theoretical and methodological concerns regarding how the relationship between motivation, creativity and innovation has been studied in previous research. Although this overview is not meant to be in any way exhaustive, it comprises several critical issues that have been repeatedly raised by creativity and innovation researchers throughout the past decade. I have grouped them into specific research challenges which will serve as a general outline for the primary objectives of the present dissertation.

CHALLENGE 1: CYCLICAL NATURE OF INNOVATION

Existing innovation research often depicts the relationship between motivation and innovation as a simple input-output process. The underlying rationale for this relationship is quite straightforward: innovation is the final result of preceding motivational processes. Although this conceptualization seems legitimate, it can be fundamentally criticized for its incomplete and even inaccurate portrayal of how the relationship between motivation and innovation unfolds in time. This is because innovation in organizations is not a static or linear process which displays an apparent discrete end-point (Anderson et al., 2004). On the contrary, innovation processes are longitudinal and cyclical in nature with alternating sequences of innovation initiation, implementation and adaptation (West, 2002).

Consequently, this dynamic perspective on innovation casts a different light on how the development of motivation during innovation processes should be understood. More specifically, when individuals aim to pursue a creative idea, it is very likely that their motivational level to undertake innovative actions will not remain constant but will fluctuate over time. For example, individuals who are initially motivated to conduct innovative activities may lose their drive along the way and eventually fail to carry out their ideas for which they were once so passionate about. Furthermore, there are also people who may be quite skeptical or even pessimistic about the purpose or impact of their innovative efforts at first, but as they invest time and effort in their innovation project, they genuinely get caught up in it. Hence, it is very likely that one’s motivational
orientation not only affects subsequent innovative efforts but will also be shaped by previous attempts to carry out innovative activities. This reasoning coincides with earlier research which has suggested that innovation processes may result in the restructuring of individual cognitions, perceptions and psychological processes (Bunce & West, 1994; Janssen, Van De Vliert, & West, 2004). In this regard, a reciprocal model might be conceptually the most viable representation of the dynamic relationship between the development of motivational states, creativity and innovation.

An important step toward an adequate re-conceptualization of the motivation-innovation relationship is to give more attention to the motivational outcomes of innovation and therefore to examine innovation as an independent variable. This should be a welcome addition to innovation research that has mostly approached innovation as a dependent variable. Furthermore, the need for longitudinal research in the domain of creativity and innovation cannot be overstated as cross-sectional designs obscure the longitudinal and iterative nature of innovation processes (Anderson et al., 2004; Baer & Frese, 2003). In terms of theory, these methodological improvements should facilitate the integration of conceptual frameworks that highlight the dynamic motivational processes that operate within individuals. For example, self-determination theory posits that behaviors that are initially prompted by external drivers can be internalized, and when integrated into one’s identity, people are more likely to act with a full sense of volition and choice (Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). This seems a useful framework to investigate how optimal motivational states can be developed and maintained over time.

**Challenge 2: Multi-level nature of innovation**

Given the central role attributed to motivational strivings for individual creativity and innovation in past research, it is remarkable to see how little attention has been paid to the impact of collective motivational states on creativity at the team level. In recent years, scholars have begun to systematically identify potential facilitators, but a clear model of how collective motivation relates to team creativity and its link to previously identified antecedents is currently lacking.
In order to clearly delineate the specific challenges that are associated with multi-level research in the domain of creativity and innovation, it is important to differentiate between two streams of work. First, a number of cross-level studies have looked at the relationship between team-level stimuli and the creative and innovative performance of individual team-members (e.g., Chen, Sharma, Edinger, Shapiro, & Farh, 2011; Hirst, Van Knippenberg, & Zhou, 2009). A second category of studies have paid attention to the relationship between team-level stimuli and the creative and innovative performance of teams as a whole (e.g., Shin & Zhou, 2007). However, as Hülsheger and colleagues (2009) clearly demonstrated in their meta-analysis on team-level predictors of innovation, the nature of the relationship between team variables and innovation may strongly depend on the measurement level of innovation (i.e., individual versus team level). For example, their results indicated that although team size was positively related with team innovation, this relationship was negative when looking at individual innovation. They argued that larger teams have a variety of skills and knowledge at their disposal which should therefore benefit innovation at the team level. On the other hand, as tendencies to engage in social loafing are elevated in larger teams, members of such teams will reduce their individual effort, which should lead to reduced levels of individual innovation.

Both lines of research comprise components that are situated at the team-level and therefore may yield actionable knowledge for organizations to manage creativity and innovation among teams. Nevertheless, they fundamentally differ in their methodological approach and psychological theorizing about how creativity and innovation emerge. More specifically, cross-level studies with team-level predictors and individual-level outcomes look at psychological mechanisms that are situated at the individual level to explain these relationships. In contrast, studies that focus on the team-level as a single level of analysis need theoretical frameworks that are exclusively situated at the team-level. However, theoretical perspectives and empirical evidence on team-level processes are still scarce in the field of creativity and innovation research. Especially team motivation is a relatively neglected feature in creativity and
innovation research (For exceptions see De Dreu, Nijstad, Bechtoldt, & Baas, 2011; Shin & Zhou, 2007). Hence, team creativity research is in need of new theoretical perspectives and empirical evidence in order to gain a deeper understanding of the motivational processes that underlie the effects of several team-level antecedents on team creativity.

**CHALLENGE 3: SOCIAL NATURE OF INNOVATION**

Creative and innovative activities do not take place in a vacuum. Even though individuals may be motivated and have the capacity to perform, the opportunity to act (i.e., implying factors that are external to individuals) is still a critical condition for creative and innovative success (Axtell et al., 2000). In this regard, the generation and implementation of ideas typically depend upon the knowledge, resources and support that is available in one’s social environment (e.g., Baer, 2010; Janssen, 2000; Richter, Hirst, van Knippenberg, & Baer, 2012; Zhou, 2003). Hence, it is imperative to consider the social nature of creativity and innovation processes to gain a better understanding of how and when motivational states are more likely to influence the creative and innovative performance of individuals. The importance of the immediate (e.g., supervisors, teams) and broader (e.g., organizational) social context has been highlighted and addressed in the creativity literature as the ‘interactionist perspective’. This perspective suggests that creativity (and to a larger extent innovation) is a product of individual characteristics, social influences, and the interaction between the two (Shalley, Gilson, & Blum, 2009; To, Fisher, Ashkanasy, & Rowe, 2012; Wang & Cheng, 2009). This principle has been nicely illustrated in a study by Zhou and George (2001). Specifically, they found that committed employees with high job dissatisfaction would only engage in creative activities (i.e., as an expression of voice) if they experienced strong organizational support for creativity. However, in case of low organizational support of creativity, their creative performance would drop substantially.

Furthermore, contextual factors have also been argued to influence the psychological outcomes of individuals who are carrying out innovation activities. For example, Janssen (2004) demonstrated that employees who take an innovative approach in their job, run the risk of experiencing job-related
anxiety and burnout, but only when they perceive that their innovative efforts are not fairly rewarded by the organization. This finding highlights the role of the broader environment in regulating the psychological consequences of innovative work behavior. This initial evidence notwithstanding, there has not been a systematic investigation on when employees may benefit from and other times will pay the costs for engaging in innovative activities (Janssen et al., 2004). Extending this line of research would help to improve our knowledge on how the social environment contributes to the development and conservation of optimal motivational states of individuals that engage in creative and innovative work.

**Challenge 4: Dual Nature of Innovation**

Innovation processes require a broad set of activities, which, at first sight, may appear contradictory. On the one hand, innovation depends strongly on exploratory action, which comprises experimenting, taking risks and sufficient cognitive flexibility in order to depart strongly from the status quo. On the other hand, innovation also needs exploitation action, which enables a systematic use of familiar knowledge and acquired abilities (Audia & Goncalo, 2007; Bledow et al., 2009; Rosing, Frese, & Bausch, 2011).

In this regard, most theoretical models of innovation also differentiate at least two components of innovation: idea generation and idea implementation (e.g., Kanter, 1988; Scott & Bruce, 1994; West, 2002). Although idea generation and idea implementation also may encompass different activities, the tension between exploration and exploitation cannot entirely be broken down into the idea generation and implementation stages of innovation processes. In spite of the fact that it would seem reasonable to subsume idea generation activities exclusively under the exploration side of innovation, recent research suggests that multiple pathways can lead to the development of creative ideas. More specifically, De Dreu, Baas, and Nijstad (2008) have proposed a dual-pathway model to creativity in which ideas can be generated through cognitive flexibility (i.e., exploration) as well as through effortful persistence (i.e., exploitation). Furthermore, as unanticipated difficulties and opportunities may arise when trying to implement ideas, the exploration of new strategies to approach these
problems are also relevant in later stages of innovation processes (Mumford, Scott, Gaddis, & Strange, 2002).

This duality is also reflected in the range of ideas that may evolve into different types of innovations. Innovations can be incremental if they are based on ideas that offer minor modifications to existing practices and products (i.e., exploitation oriented). Innovations that emerge from radical ideas imply new and set-breaking frameworks or processes (i.e., exploration oriented) (Gilson & Madjar, 2011). Both types of innovations might be equally valued by organizations. Incremental innovations facilitate stable growth of a company whereas radical innovations may result in higher profits but also potentially yield greater losses and risks (Benner & Tushman, 2013; Madjar, Greenberg, & Chen, 2011; Taylor & Greve, 2006).

Thus, research should further elaborate on the conceptual distinction between exploration and exploitation activities, both relevant for creativity and innovation, as they require different motivational processes and are therefore most likely fostered under different conditions (Madjar et al., 2011).

**THE PRESENT DISSERTATION**

The present dissertation aims to advance our current understanding of how the dynamic relationship between motivation, creativity and innovation takes shape across time. To this end, 4 empirical studies were designed to address one or more of the previously discussed research challenges. Whereas the first two empirical chapters (2 and 3) shed light on innovative behaviour (i.e., activities related to the generation, promotion and implementation of ideas), in the last two empirical chapters (4 and 5) we take a more specific approach by exclusively focusing on creative behaviour (i.e., activities related to the generation of ideas). Table 1 provides an overview of the challenges addressed by each empirical study. This introduction will be followed by 4 empirical chapters and a general discussion.
Chapter 2, titled ‘Keep the fire burning: Reciprocal gains of basic need satisfaction, intrinsic motivation and innovative work behaviour.’, is the first empirical chapter of the present dissertation. This study challenges the traditional perspective on individual innovation that depicts intrinsic motivation exclusively as an antecedent of innovative work behaviour. More specifically, we will argue that the relationship between intrinsic motivation and innovative work behaviour is more complex than a simple one-way causal link, and is rather characterized by reciprocal dynamics. Furthermore, by drawing on insights from self-determination theory, we propose basic psychological need satisfaction (i.e., need for competence, autonomy and relatedness) as an intermediate mechanism to explain this dynamic relationship across time. To test our hypothesized reciprocal model, we adopted a longitudinal survey design (i.e., comprising a six-day period) and used multi-source data from 76 students in industrial product design and electronic engineering who participated in an innovation boot camp. This setting is particularly interesting to investigate innovation processes as participants had to work on real industrial cases that were provided by collaborating organizations. Furthermore, as these organizations could possibly adopt the prototypes and concepts that were developed for each case, illustrates the realistic and professional nature of this innovation program.

Chapter 3, titled ‘The Motivational Impact of Day-level Innovative Work Behavior: A Self-Determination Theory Perspective.’, delves deeper into the conditions under which individual innovative efforts will be more likely
associated with motivational benefits. Within the context of a lagged longitudinal model (in line with chapter 2), we collected daily survey data from 100 students industrial product design and engineering who were carrying out innovative activities throughout the course of an innovation boot camp (i.e., a seven-day period). In this chapter, we further elaborate on insights provided by self-determination theory, and examine whether success and sufficient support for innovation may help innovators to satisfy their subsequent basic psychological needs, and therefore may facilitate the development of motivation across time.

Chapter 4, titled ‘When creative self-efficacy makes the difference: A within-person approach on the pursuit of radical and incremental ideas.’, takes a closer look at the dynamic relationship between creative self-efficacy and individual creativity across time. Using a lagged longitudinal design, we conducted a survey study with 35 final year students in industrial product design involved in an industrial prototyping project over a period of 14 weeks. This chapter presents a within-person perspective on when momentary states of creative self-efficacy are associated with two specific forms of creativity: namely radical and incremental creativity. More specifically, by examining psychological idea ownership and outcome expectancy as two boundary conditions that facilitate or impede exploratory or exploitative processes, we aim to provide actionable knowledge on how creative self-efficacy can be employed more efficiently to obtain specific creative outcomes.

Chapter 5, titled ‘What makes creative teams tick? Resources, engagement and performance across creativity tasks.’, is the last empirical chapter of the present dissertation. In this chapter, we integrate theoretical principles of the job demands-resources model to examine team motivational states underlying the creative performance of project based teams. This study advances collective task engagement as an underlying motivational mechanism through which team social resources (i.e., cohesion and coordination) may affect team creativity. Furthermore, we examine whether team social resources and team creative performance are reciprocally related across subsequent task episodes in time. To do so, we relied on a three-wave longitudinal organizational simulation exercise, in which 118 project teams (i.e., 605 individuals) conducted
three creativity tasks. This way, we aim to extend prior creativity research that mainly has focused on the impact of motivational dynamics on creativity and innovation at the individual level and provide a much needed insight in how team creativity develops over time.

Chapter 6 comprises a general discussion of all empirical chapters included in this dissertation. In this chapter, I aim to integrate and discuss the key findings and main contributions of this dissertation with a special attention to theoretical and practical implications. In addition, limitations, and avenues for future research will be presented.
REFERENCES


CHAPTER 2

KEEP THE FIRE BURNING: RECIPROCAL GAINS OF BASIC NEED SATISFACTION, INTRINSIC MOTIVATION AND INNOVATIVE WORK BEHAVIOR.

ABSTRACT
Drawing on insights from self-determination theory, we explored the dynamic relationship between intrinsic motivation and innovative work behavior (IWB) over time. Specifically, we investigated how basic need satisfaction influences IWB through its effect on intrinsic motivation and how IWB in turn, affects basic need satisfaction as measured the next day (i.e., a reciprocal relationship). The current study used a longitudinal design comprising a six-day period and relied on multi-source data from 76 students in industrial product design and electronic engineering who participated in an innovation boot camp. In general, results provided support for the mediating role of intrinsic motivation in the relationship between basic need satisfaction and IWB, as well as the reciprocal relationship between basic need satisfaction and IWB.

This chapter is based on: Devloo, T., Anseel, F., De Beuckelaer, A., & Salanova, M. (2013). Keep the fire burning: Reciprocal gains of basic need satisfaction, intrinsic motivation and innovative work behavior. Manuscript under revision.
INTRODUCTION

To ensure future success in a fiercely competitive and changing environment, organizations are expected to continuously reinvent themselves, anticipate future challenges, search for new ways to approach their core business and keep their target market interested. Past research has identified creativity and innovation as important factors for organizational success (e.g., Amabile, 1988; Janssen & Huang, 2008; Janssen, Van De Vliert, & West, 2004; Scott & Bruce, 1994; Van der Vegt & Janssen, 2003). Hence, it is crucial for organizations to nurture employee creativity to obtain new ideas, help them in promoting their ideas and in developing innovative products and implementing new working strategies. In the academic literature, these three components of employee innovation (i.e., idea generation, promotion, and implementation) are commonly referred to as innovative work behavior (IWB). Not surprisingly, scholars as well as practitioners are deeply engaged in the quest for potential determinants and effective strategies to stimulate employees’ IWB.

Since the origins of innovation research, intrinsic motivation has been claimed to be one of the main motivational drivers of IWB (i.e., this is referred to as the ‘intrinsic motivation perspective’, Amabile, 1983, 1996; Collins & Amabile, 1999; Hüttermann & Boerner, 2011). Intrinsic motivation refers to motivation that comes from inside an individual rather than from external or outside rewards and thus the extent to which an individual engages in an activity for the sake of the activity itself (Deci & Ryan, 1987; Dysvik & Kuvaas, 2011). Empirical research supporting this claim has however, mostly focused on the relationship between intrinsic motivation and creativity (i.e., mainly important for idea generation) (Amabile, 1979, 1985), without much attention for those dynamic aspects that may characterize a successful innovation process (i.e., continuously evolving cycles rather than static phases). Instead, inspired by the causal link between intrinsic motivation and creativity, recent studies on IWB have predominantly proposed and examined contextual characteristics of the job and work setting that are assumed to facilitate IWB via their effects on employee intrinsic motivation (e.g., Janssen & Van Yperen, 2004; Shalley, Zhou, & Oldham, 2004). As a result, the intrinsic motivation perspective has emerged as one of the most dominant theoretical frameworks guiding research.
on IWB (i.e., treating intrinsic motivation as an antecedent of IWB). This dominant focus, depicting intrinsic motivation as an antecedent of IWB, is rarely challenged. However, given the complex and dynamic nature of an innovation process, the present study argues that the relationship between intrinsic motivation and IWB may not be as straightforward as suggested by previous research. When pursuing creative ideas within organizations, one’s motivational level to undertake innovative actions may not remain at a constant level but will instead fluctuate over time. Specifically, the current study advances the idea that psychological processes such as decreases or increases in the level of intrinsic motivation may not only precede, but may also follow IWB.

Surprisingly, to date, innovation research has paid no attention to how intrinsic motivation and IWB may influence each other over time. The present study suggests that a longitudinal reciprocal model might conceptually be the most viable representation of the relationship between intrinsic motivation and IWB. Hence, the aim of this paper is to extend the current static perspective on the role of intrinsic motivation in IWB by developing and testing a model that depicts a reciprocal relationship between intrinsic motivation and IWB. In addition, we aim to uncover the psychological mechanisms underlying the fluctuations of intrinsic motivation over time. Drawing on self-determination theory literature, the present study looks at basic psychological need satisfaction (i.e., need for competence, autonomy and relatedness) as an intermediate mechanism to explain the proposed reciprocal relationship between intrinsic motivation and IWB across time (Deci & Ryan, 2000; Van Den Broeck, Vansteenkiste, De Witte, & Lens, 2008).

Thus, the current study contributes to the literature in two substantial ways. First, by modeling the reciprocal relationship between intrinsic motivation and IWB in a longitudinal research design, this study goes beyond the traditional perspective that exclusively conceptualized innovation as the endpoint of preceding motivational processes. Second, by introducing basic need satisfaction as a central motivational construct in the innovation process, the present study aims to integrate and apply insights from self-determination theory to disentangle the reciprocal nature of sustainable employee innovation processes.
MOTIVATIONAL DRIVERS OF INDIVIDUAL INNOVATION

In accordance with previous research, the present study defines individual innovation as: “the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption designed to significantly benefit the individual, group, or organization” (West & Farr, 1990, p. 9). This definition implies that innovation is not an exclusive matter for R&D professionals but can also be carried out by all employees in a wide range of divisions of an organization. For instance, employees can suggest new working methods to improve their effectiveness, reflect on how current services may be facilitated, or provide support or resources when a particular idea needs to get implemented in the organization.

Scott and Bruce (1994) conceptualized individual innovation into the overarching construct ‘innovative work behavior’ (IWB). This construct represents a set of multiple behaviors that correspond with different stages of the innovation process, being the generation or introduction of ideas in the work environment, mobilizing support for these ideas and finally realizing and implementing accepted ideas. Furthermore, it is not uncommon for individuals to be engaged in various combinations of these activities (i.e., idea generation, idea promotion, idea realization) at any given moment in time as the innovation process is frequently characterized by discontinuous activities (Janssen, 2000; Scott & Bruce, 1994). A construct closely related to IWB is creative behavior which refers to the generation of ideas that are original and useful (Amabile, 1988, 1996; Zhou, 1998). IWB can be considered as a broader and encompassing behavioral construct as it not only involves the generation of ideas (i.e., creative behavior) but also refers to those (social) activities that are important to transform ideas into concrete innovations (Chen, Sharma, Edinger, Shapiro, & Farh, 2011; Janssen & Van Yperen, 2004; Yuan & Woodman, 2010).

A substantial body of literature has emphasized the importance of the motivational orientation of individuals when engaging in creative activities (e.g., Amabile, Hill, Hennessey, & Tighe, 1994; De Stobbeleir, Ashford, & Buyens, 2011; Rego, Sousa, Marques, & Cunha, 2012). In general, research on the
relationship between work motivation and creativity has been based on insights provided by the intrinsic motivation perspective, which has later been developed more broadly into self-determination theory (Deci & Ryan, 1987; Gagne & Deci, 2005). This theory states that motivation can be described along an ‘autonomy continuum’ going from autonomous (i.e., self-determined) motivation at one end of the spectrum to controlled motivation at the other end of the spectrum. Autonomous motivation represents the extent to which an individual acts out of free will and experiences a certain amount of choice regarding his or her own behavior. Intrinsic motivation, the type of motivation that has been the focus of most creativity research, is considered to be the most typical autonomous form of motivation. Individuals who are intrinsically motivated, tend to engage in particular activities because the task at hand is experienced as interesting and pleasant. In contrast, extrinsically motivated individuals will not perform a task or activity for its own sake (i.e., inherently satisfying) but because of ‘external’ motives such as recognition, rewards or obligation.

Intrinsically motivated employees are found to be more creative because such motivation increases their tendency to be curious, cognitively flexible and risk taking (Deci & Ryan, 1985; Grant & Berry, 2011; Rego, Sousa, Marques, & Cunha, 2012b; Zhou, 2003), all of which should facilitate the development of creative ideas. As research on IWB has been developed from the creativity literature, it has also adopted the influential intrinsic motivation perspective (Frese, Teng, & Wijnen, 1999; West, 1987, 2002). Specifically, intrinsic motivation is assumed to be conducive for innovativeness as it increases the likelihood that divergent information is effectively processed and different approaches to a particular problem are explored, hence leading to potentially better and more innovative solutions (Amabile, 1985, 1988). Furthermore, when pursuing ideas, individuals are likely to be confronted with several obstacles such as resistance to change or a lack of resources (e.g., support from management or time), which might impede the successful implementation of ideas (Janssen, 2003). Intrinsic motivation is a crucial factor during the innovation process to overcome these obstacles as it makes people more goal-oriented, resilient and persistent in the face of such barriers (Deci & Ryan,
Consequently, previous work on individual innovation has typically explained the effects of antecedents (e.g., work environment, job characteristics, individual difference variables) on IWB through their impact on intrinsic motivation (e.g., Janssen & Van Yperen, 2004; Knol & Van Linge, 2009).

However, several scholars have called attention to the fact that employee innovation is not a straightforward linear process with antecedents directly affecting IWB. Instead, they urged the need to model the inherent reciprocal nature of the innovation process to better understand the relationship between intrinsic motivation and IWB (Anderson, De Dreu, & Nijstad, 2004). Too often, innovation is treated as a single outcome variable. This approach fails to recognize that innovative actions may also initiate or affect other psychological processes (Anderson et al., 2004; Janssen et al., 2004). Specifically, the degree to which people will engage in innovative activities and the corresponding motivational orientation as to why they behave in that particular way may vary over time and will affect each other over time. Hence, a longitudinal design examining both constructs is necessary to adequately capture the dynamic relationship between intrinsic motivation and IWB. Furthermore, current theory needs to be expanded to understand how the relationship between intrinsic motivation and IWB unfolds over time. The present study proposes ‘basic need satisfaction’ as a central motivational construct that explains the reciprocal relationship between intrinsic motivation and IWB over time.

**Reciprocal Gains of Intrinsic Motivation and Innovative Work Behavior**

Self-determination theorists have suggested that intrinsically motivated behavior is a function of the extent to which one’s basic psychological needs are satisfied, that is, the needs for autonomy, competence and relatedness (Deci, Koestner, & Ryan, 1999; Grolnick, Ryan, & Deci, 1991). In self-determination theory, this set of three psychological needs is advanced as the vital nutriment for the psychological growth of individuals, their well-being and optimal functioning (Deci & Ryan, 2000; Patrick, Knee, Canevello, & Lonsbary, 2007). Although basic need satisfaction is typically conceptualized as a higher order construct referring to the extent to which individuals’ overall needs are satisfied,
three different needs can be distinguished (Greguras & Diefendorff, 2010; Leroy, Anseel, Gardner, & Sels, in press). First, the need for autonomy refers to the desire that individuals have to experience a certain degree of psychological freedom regarding their behavior and thus to have a sense of choice rather than feeling controlled or pressured. Second, the need for competence involves feelings of efficiency when individuals interact with their environment rather than feeling incompetent when displaying a particular behavior. Finally, the need for relatedness represents individuals’ desire to be meaningfully connected to others and to feel accepted as a group member (Greguras & Diefendorff, 2009; Ryan & Deci, 2000).

Self-determination theory postulates that these three psychological needs are innate to all individuals and that the combined satisfaction of these needs is essential to maintain one’s intrinsic motivation (Deci & Ryan, 2000, 2005; Sheldon & Filak, 2008). However, it should be noted that self-determination theory defines psychological needs as a function of the extent to which these needs are satisfied rather than how basic needs differ in strength between or within persons. Previous research findings in the work domain already suggested that the satisfaction of basic psychological needs is a crucial factor leading to better work performance. For instance, Greguras and Diefendorff (2009) demonstrated that a high level of person-environment fit predicted basic need satisfaction, which in turn affected employee commitment and performance. Similarly, Leroy et al. (in press) found that the effects of authentic leadership and employee authenticity affected work role performance through basic need satisfaction.

Given that basic need satisfaction promotes autonomous forms of motivation (Deci & Ryan, 2008; Gagne & Deci, 2005), this construct should be particularly relevant for individual innovation which benefits from high levels of intrinsic motivation (Amabile, 1988; Janssen & Van Yperen, 2004). Specifically, it is our contention that basic need satisfaction indirectly facilitates IWB through the development of intrinsic motivation. Theoretically, we expect that when individuals simultaneously have a feeling of control about their actions, have a sense of mastery about their tasks, and feel well connected to their colleagues, and thus experience basic need satisfaction, they will be more
likely to engage and persist in innovative activities as they find these endeavors inherently interesting, stimulating and pleasant. By contrast, when basic needs are thwarted, intrinsic motivation should diminish, and in this case individuals are expected to exhibit low levels of IWB. Furthermore, consistent with past work, we combined the three needs to form a composite score for general need satisfaction as self-determination theory suggests that the satisfaction of one particular need typically occurs in concert with the satisfaction of the other two needs, so that all three are positively associated (e.g., Deci et al., 2001; Leroy et al., in press; Van Den Broeck et al., 2008).

**Hypothesis 1.** Intrinsic motivation mediates the relationship between basic need satisfaction and IWB.

Basic need satisfaction is said to have an energizing power, in the sense that once individuals’ psychological needs are fulfilled, they are more likely to proactively engage in subsequent need fulfilling activities (Deci & Ryan, 2000). In other words, need fulfillment may not exclusively depend on external conditions (e.g., organizational/job characteristics), but can also be facilitated by individuals’ behavioral actions. Consistent with this theoretical rationale, Greguras and Diefendorff (2010) demonstrated that the pursuit of autonomous goals is positively related to basic need satisfaction (i.e., the combined satisfaction of autonomy, competence, and autonomy needs). More specifically, they argue that people who engage in goal striving for autonomous reasons, are more likely to satisfy their basic needs as they may engage in self-directed activities (i.e., need for autonomy), develop new skills (i.e., need for competence) or rely on a group to achieve their goals (i.e., need for relatedness).

In the present study, we propose that this mechanism of need fulfillment is crucial for the understanding of how sustainable innovation processes are developed across time as we hypothesize that IWB not only results from sufficient need fulfillment and intrinsic motivation, but can also be approached as a need-fulfilling experience itself. Specifically, we argue that people who engage in IWB and thus challenge the status-quo by looking for new ways to do things, are more likely to create opportunities for themselves that lead to
subsequent need-fulfillment across time. For example, by coming up with ideas on their own initiative, individuals may satisfy their need for autonomy. Similarly, actively engaging in social oriented activities to build connections to promote ideas and to find support for ideas, may help people to satisfy their need for relatedness. Furthermore, individuals that aim to get their ideas implemented and see how they may impact their work environment, are more likely to satisfy their need for competence. Overall, by successfully engaging in innovative behaviors, we believe individuals to be more likely to experience the concerted satisfaction of all three needs. Hence, this study proposes a reciprocal relationship between basic need satisfaction, intrinsic motivation and IWB such that engaging in IWB contributes to future basic need satisfaction and thus fuels the subsequent motivational chain.

_Hypothesis 2._ Engaging in IWB leads to subsequent basic need satisfaction.

**METHOD**

**SAMPLE AND SETTING**

We conducted a longitudinal field study (i.e., a six-day period) in an educational setting involving students in industrial product design and electronic engineering. Although at first, a student sample may seem to be limited in its potential for generalizability to work settings, the current setting is particularly relevant for organizations. The use of innovation boot camps as the one studied in the current study has increasingly grown in contemporary organizations for developing innovation and entrepreneurial skills in their technologists (Clarysse, Mosey, & Lambrecht, 2009). The sample consisted of a group of 99 students from several European universities who participated in an innovation boot camp on designing ‘sustainable products’. Due to missing values in some of the study variables over the entire six-day period, the sample size for the main analyses was reduced to 76 valid cases. Of these 76 participants, 56 were men (73.3 percent) and the mean age was 21.26 years ($SD = 2.32$). The main objective of this innovation boot camp was to provide future designers and engineers the opportunity to work in an international and multi-disciplinary context on a real-
life industrial case, put together by innovation managers of multiple participating companies. Participants worked on one of the six industrial cases that were provided by collaborating organizations (i.e., the number of people that worked on a particular case ranged from 11 to 14). All industrial cases were equivalent in that they all shared the same objective: the development of more sustainable green products or processes. During the innovation boot camp, participants had to attend a theoretical session in the morning (e.g., on energy saving technology and cleaner production techniques) and they could apply the knowledge acquired in the afternoon workshop. During the afternoon sessions, participants worked on the development of innovative solutions related to their case. Furthermore, the end result (i.e., prototype or concept) had to be presented to the enterprise involved at the end of the innovation boot camp. Hence, the highly realistic nature of this innovation boot camp (i.e., real-life case) contributed to the external validity of our study as the key components representing the dynamic nature of the innovation process were present.

**Procedure**

A week before starting the innovation boot camp, participants were contacted by email to inform them about the study. Participants were told that one of the purposes of this innovation boot camp was to map their experiences of psychological factors during the innovation process. They were promised to receive a personalized feedback report on the basis of the surveys that would be completed throughout the entire training period. Furthermore, in the same email they were requested to complete a first electronic survey providing demographic information.

During the actual innovation boot camp (at the end of each full training day), participants were instructed to complete a survey concerning the activities they conducted during the afternoon session. All survey items were in English as this was the common language used among the participants and trainers. To reduce common method bias, we also included peer ratings. More specifically, each afternoon participants had to evaluate the extent to which two of their companion students (i.e., that worked on the same case) engaged in IWB (see description below). The students to be evaluated changed every day to ensure a
balanced performance assessment. This way, each day an IWB score was obtained for every participant by averaging the two ratings that were provided by a different combination of raters (i.e., neutralizing rater-biases whenever present). Complete confidentiality was guaranteed to all participants.

MEASURES

All items included in the daily surveys were adapted so that they referred to the particular activities that were completed during the afternoon sessions.

**Basic need satisfaction.** This construct was assessed by 10 items from the work-related basic need satisfaction scale of Van Den Broeck and colleagues (2009). The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree. Coefficients alpha (i.e., Cronbach’s alpha) across all measurement moments ranged from .77 to .85 (*mean alpha* = 0.81).

**Intrinsic motivation.** This construct was assessed by three items from the intrinsic motivation subscale of the situational motivation scale of Guay, Vallerand and Blanchard (2000) (see also Lustenberger & Jagacinski, 2010; Rich, Lepine, & Crawford, 2010; Zapata-Phelan, Colquitt, Scott, & Livingston, 2009). The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree. Coefficients alpha (i.e., Cronbach’s alpha) across all measurement moments ranged from .86 to .95 (*mean alpha* = 0.88).

**Innovative Work Behavior (IWB).** This construct was assessed by Janssen's (2000) nine-item IWB scale. To reduce common method bias, we opted to measure this variable by using peer-ratings instead of self-ratings. Peer-ratings of each individual were obtained from two peers each day. The answers were scored on a seven-point anchored Likert scale ranging from 1 = never to 7 = always. Following Janssen and Van Yperen (2004), we averaged the nine items to obtain an overall score of IWB. Moreover, we averaged the two peer-ratings to obtain one final score for IWB.¹ Coefficients alpha (i.e., Cronbach’s alpha) across all measurement moments ranged from .92 to .97 (*mean alpha* = 0.95).
ANALYTICAL APPROACH

To test our hypotheses, we used path analysis by estimating a system of linear equations including only observed variables. To simultaneously estimate all path coefficients, we used partial least squares analysis (PLS) which focuses on maximizing the variance explained for the dependent variables in the model (with significance testing based on 1,000 resamples with replacement of the original data; N = 76; see Table 2). On grounds of increased statistical power the use of PLS is often recommended with relatively small sample sizes (see Reinartz, Haenlein, & Henseler, 2009). For every respondent, each variable score measured at a specific day (i.e., basic need satisfaction, intrinsic motivation, and IWB) was treated as an ‘observed’ variable as its score was set equal to the mean score of its indicators observed during that day. We considered conceptualizing each construct as a single factor underlying its indicator variables (i.e., all corresponding survey items).

However, the analysis sample of this study (i.e., comprising N = 76 valid cases) was rather small, implying that one must be cautious about increasing model complexity. Given the small sample size we relied on a 90% confidence interval (i.e., $p < .10$) when testing the significance of structural relations. We are very aware that, notwithstanding repeated calls for abandoning $p < .05$ significance testing (Fidler, Thomason, Cumming, Finch, & Leeman, 2004), this is not the prevalent convention in organizational sciences. However, two indicative power analyses for path analysis showed that to keep a minimum chance of 70% (i.e., power) to detect a path coefficient as small as 0.25 (for intrinsic motivation and basic need satisfaction) or below 0.20 (feasible for IWB) an alpha level of .10 had to be chosen instead of the more traditional alpha level of .05. In other words, to keep power levels of the analysis at a reasonable level some decrement in confidence (from 95% to 90%) was deemed necessary. The longitudinal nature of our study offered the possibility to test all psychological effects repetitively, that is on each day. Through repetitive testing and reconfirmation of earlier results ‘overall confidence’ in the test results should increase (despite a slightly lower level of confidence in the results obtained on specific days; Lubinski, Webb, Morelock, & Benbow, 2001).
The analytical procedure to test the hypothesized dynamic mechanisms consisted of two consecutive steps. The first step involved deciding on the most adequate baseline model describing the extent to which construct scores (i.e., basic need satisfaction, intrinsic motivation, and IWB) show stability over time. To this end, a statistical evaluation (based on information criteria such as AIC and BIC) was made of a ‘first-order autoregressive (or first-order Markov) model’. The first-order regressive model is based on the idea that every variable score at any given point of time (i.e., a specific day) is influenced by the variable score at the previous point in time (i.e., the previous day) (see for instance, Frese et al., 2007). A second, alternative model concerned the ‘autoregressive one-factor model’. This model imposes one underlying factor for every construct, and conceives time-specific construct scores (i.e., a time-specific mean indicator score) as indicators of that factor. In this model, time-specific measurements reflect the true construct score, which is stable over time (i.e., captured by the factor loadings), and time-specific deviations from the true construct score (i.e., captured by measurement errors). Factor loadings, item intercepts and measurement errors are freely estimated. Information criteria (i.e., AIC and BIC) derived for the two alternative (non-nested) baseline models revealed that the first-order autoregressive model was to be preferred.

The second step of the analysis aimed at evaluating the reciprocal dynamics between basic need satisfaction and IWB. The elaborated model imposed the relationship between IWB and basic need satisfaction onto the first-order autoregressive model, which depicted the interdependencies in the data one should statistically control for. On the basis of the size and the significance of the estimated path coefficients as derived from this elaborated model, one can test for the hypothesized reciprocal relationship between basic need satisfaction and IWB. In addition, the estimated path coefficients also reveal whether the hypothesized mediating role of intrinsic motivation in the relation between basic need satisfaction and IWB is supported. Depending on whether or not basic need satisfaction at a given day is found to substantially influence IWB at the same day, one may empirically distinguish between a partial and a full mediation effect.
As the innovation boot camp is essentially a developmental setting in which non-controlled and time-specific contextual factors may also affect the focal structural relationships between constructs (see H1 and H2), all structural relationships are studied at every subsequent point in time while statistically controlling for the previous scores on these focal constructs. Hence, an autoregressive trajectory process was modeled, and was considered to be a maximally informative representation of the underlying developmental process. Moreover, the repeated nature of the autoregressive trajectory process, allows a repetitive assessment (over time) of the nature of the structural relationships between all focal constructs.

**RESULTS**

Descriptive statistics (i.e., mean, standard deviation, correlations and coefficients alpha) of the main variables of this study are presented in Table 1.
Table 1

Descriptive statistics, correlation coefficients and Cronbach’s α

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<tr>
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<td>.17</td>
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<td>.58**</td>
<td>.47**</td>
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<td>0.65</td>
<td>.48**</td>
<td>.33**</td>
<td>.16</td>
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<td>.25*</td>
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<td>5.12</td>
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<td>.40**</td>
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<td>0.88</td>
<td>.22</td>
<td>.38**</td>
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<tr>
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<td>.25*</td>
<td>.47**</td>
<td>.47**</td>
<td>.28*</td>
<td>.49**</td>
<td>.40**</td>
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<td>.50**</td>
<td>.36**</td>
<td>.57**</td>
<td>.56**</td>
</tr>
</tbody>
</table>

Note. Cronbach’s α coefficients are reported on the diagonal. BNS = Basic Need Satisfaction, IM = Intrinsic Motivation, IWB = Innovative Work Behavior. T1 = Day t, T2 = Day t+1, T3 = Day t+2, T4 = Day t+3, T5 = Day t+4, T6 = Day t+5. *p < .05. **p < .01.
Table 2
Path coefficients as estimated in the elaborated model using partial least squares analysis in SmartPLS Version 2 ($N = 76$)

<table>
<thead>
<tr>
<th></th>
<th>Day t</th>
<th>Day t+1</th>
<th>Day t+2</th>
<th>Day t+3</th>
<th>Day t+4</th>
<th>Day t+5</th>
</tr>
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<tbody>
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<td><strong>STRUCTURAL RELATIONS</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>A: Effect of IWB (previous day) on BNS</td>
<td>N.A.</td>
<td>.13*</td>
<td>-.31**</td>
<td>.16**</td>
<td>.12*</td>
<td>.16**</td>
</tr>
<tr>
<td>Diagnosis: existence of a reciprocal effect</td>
<td>Not testable</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>B: Effect of BNS on IM</td>
<td>.62**</td>
<td>.59**</td>
<td>.39**</td>
<td>.41**</td>
<td>.23**</td>
<td>.39**</td>
</tr>
<tr>
<td>C: Effect of IM on IWB</td>
<td>.41**</td>
<td>.26**</td>
<td>.41**</td>
<td>.14*</td>
<td>.13*</td>
<td>-.14 (n.s.)</td>
</tr>
<tr>
<td>D: Effect of BNS on IWB</td>
<td>.02 (n.s.)</td>
<td>.09 (n.s.)</td>
<td>-.07 (n.s.)</td>
<td>.09 (n.s.)</td>
<td>.20**</td>
<td>.28**</td>
</tr>
<tr>
<td>Diagnosis: type of mediation: full mediation (B and C), partial mediation (B, C, and D), and no mediation (not B and/or not C)</td>
<td>Full</td>
<td>Full</td>
<td>Full</td>
<td>Full</td>
<td>Partial</td>
<td>No</td>
</tr>
<tr>
<td><strong>STATISTICAL CONTROL</strong></td>
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</tr>
<tr>
<td>Effect of BNS (previous day) on BNS</td>
<td>N.A.</td>
<td>.47**</td>
<td>.76**</td>
<td>.61**</td>
<td>.54**</td>
<td>.37**</td>
</tr>
<tr>
<td>Effect of IM (previous day) on IM</td>
<td>N.A.</td>
<td>.24**</td>
<td>.51**</td>
<td>.37**</td>
<td>.23**</td>
<td>.39**</td>
</tr>
<tr>
<td>Effect of IWB (previous day) on IWB</td>
<td>N.A.</td>
<td>.51**</td>
<td>.47**</td>
<td>.46**</td>
<td>.56**</td>
<td>.59**</td>
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</table>

$R^2$ values (this model)

<table>
<thead>
<tr>
<th></th>
<th>Day t</th>
<th>Day t+1</th>
<th>Day t+2</th>
<th>Day t+3</th>
<th>Day t+4</th>
<th>Day t+5</th>
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<tr>
<td>BNS</td>
<td>.27</td>
<td>.49</td>
<td>.43</td>
<td>.34</td>
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<td>.21</td>
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<tr>
<td>IM</td>
<td>.39</td>
<td>.51</td>
<td>.60</td>
<td>.44</td>
<td>.15</td>
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<tr>
<td>IWB</td>
<td>.19</td>
<td>.43</td>
<td>.45</td>
<td>.32</td>
<td>.45</td>
<td>.47</td>
</tr>
</tbody>
</table>

Notes. $^a$: Relationships as determined by the first-order autoregressive model
N.A. = not applicable (in the model), BNS = Basic Need Satisfaction, IM = Intrinsic Motivation, IWB = Innovative Work Behavior.$^*p < .10. **p < .05.$
Results of the analytical procedure results are presented in Table 2. Inspection of the $R^2$-values displayed in Table 2 shows that for all constructs under study (i.e., basic need satisfaction, intrinsic motivation, IWB) reasonable $R^2$-values were obtained (i.e., mostly exceeding .30). In only four out of fifteen cases ($R^2$ [basic need satisfaction, day $t+1] = .27; R^2$ [basic need satisfaction, day $t+5] = .21; R^2$ [intrinsic motivation, day $t+4] = .15; R^2$ [IWB, day $t] = .19) $R^2$-values lower than .30 were observed.

As shown in Table 2, we found support for the mediating role of intrinsic motivation in the relationship between basic need satisfaction and IWB. For five out of six days (i.e., all days except for day $t+5$, the last day) intrinsic motivation mediated the relationship between basic need satisfaction and IWB (see Hypothesis 1). Four out of five times (see Table 2: days $t$, $t+1$, $t+2$ and $t+3$) we found support for full mediation. Thus, Hypothesis 1 was supported.

The results presented in Table 2 provide support for the hypothesized reciprocal relationship (i.e., the effect of IWB at day $t$ on basic need satisfaction at day $t+1$). In all cases (i.e., five out of five tests), the relationship between IWB in the previous period and basic need satisfaction in the next period was significant. Thus, Hypothesis 2 was supported. However, it should be noted that one of these five significant relationships yielded a negative effect of IWB on basic need satisfaction in the next period.

In sum, evidence was found for the mediating role of intrinsic motivation in the relationship between basic need satisfaction and IWB (Hypothesis 1). Moreover, our data also confirmed Hypothesis 2 as IWB generally predicted basic need satisfaction in the next period. This implies that the central constructs of this study are reciprocally related to each other.

**DISCUSSION**

The creativity and innovative behavior literatures have advanced intrinsic motivation as one of the most important motivational mechanisms that are associated with individual innovation (e.g., Amabile, 1985, 1988; Janssen & Van Yperen, 2004). Although this intrinsic motivation perspective has importantly contributed to our understanding of how and when innovative work
behaviors are more likely to occur, fluctuations in motivational orientation during these dynamic innovation processes remained underexplored to date. The present study extends current IWB theory by proposing a reciprocal relationship between intrinsic motivation and IWB across time and by identifying basic need satisfaction as a central mechanism to explain this reciprocal relationship. Findings from this study are consistent with predictions of self-determination theory as they indicate that intrinsic motivation mediates the relationship between basic need satisfaction and IWB (Hypothesis 1). Furthermore, Markov-type of cross-lagged effects of IWB on future basic need satisfaction were observed (Hypothesis 2). In sum, these results point to reciprocal gains between basic need satisfaction, intrinsic motivation and IWB across time.

However, one of the five significant cross-lagged effects of IWB on basic need satisfaction appeared to be negative (i.e., day $t+2$). A possible explanation for this unexpected observation is that innovative actions may not exclusively lead to beneficial outcomes but can also be associated with potential costs such as a decrease in intrinsic motivation (Janssen et al., 2004). The outcomes of innovative behaviors may be context-dependent and, therefore, individuals do not solely depend on their own efforts when pursuing innovative ideas. In other words, failure or success of innovative actions also depends on the amount of support received, resistance to change by colleagues or the availability of sufficient resources (Hakanen, Perhoniemi, & Toppinen Tanner, 2008; Janssen, 2003; West & Farr, 1990). Thus, it may well be that at one particular day (i.e., $t+2$), participants who displayed high levels of IWB somehow got frustrated or were not satisfied with the results of their work due to a shared, external cause (e.g., an unsatisfying feedback intervention, insufficient support from trainers). Consequently, such a situation may have led to a decrease rather than an increase in subsequent basic need satisfaction on the next day. This reasoning is consistent with Cognitive Evaluation Theory which states that intrinsic motivation might decrease when individuals experience that their environment hinders them to properly execute their own behavioral intentions (Deci & Ryan, 1985). Anecdotal evidence supports this explanation. We interviewed the trainers post hoc to inquire about this unexpected negative relationship. Apparently, on day $t+2$, a first ‘formal’ feedback moment was
organized as participants received explicit feedback from the trainers concerning the ideas they had been working on so far. However, to ensure that participants would not start too hasty with the development of a particular idea, all trainers instructed the students to continue generating more ideas (i.e., regardless of the quality of the ideas they already had). Hence, it may be the case that participants who ‘invested’ a considerable amount of effort and time in an idea on the previous day \((t+1)\) may have felt frustrated as they were asked to take a step back and further explore the problem from a different perspective. Consequently, this feedback intervention may have led to decreased basic need satisfaction on day \(t+2\) among those individuals who strongly engaged in IWB on the day before.

In spite of its contributions to a more complete modeling of the motivational dynamics of the innovation process, the present study is not without limitations. The small sample size clearly imposed restrictions on the complexity of our analytical model (e.g., number of cross-lagged paths). Further, to extend the current theoretical framework, future research should study moderators of the reciprocal relationship between IWB and basic need satisfaction. For instance, we expect feedback climate and a supportive leadership style to affect the reciprocal relationship between basic need satisfaction and IWB. Furthermore, our sample comprised of students in industrial product design and electronic engineering. Although the participating companies selected a number of innovative solutions that were developed during the boot camp, demonstrating the realistic character of our study setting, future research needs to investigate these processes in an organizational setting.

Results of the current study imply that organizations aiming to stimulate and maintain high levels of IWB among their employees should target their efforts on stimulating basic need satisfaction. In this respect, previous research has demonstrated the strong impact that supervisor’s leadership styles (e.g., authentic leadership; Leroy et al., in press) and job characteristics (e.g., social support; Van Den Broeck et al., 2008) have on basic need satisfaction.

In sum, this study challenged the traditional perspective on IWB depicting intrinsic motivation exclusively as an antecedent of IWB. We demonstrated that IWB and intrinsic motivation affect each other reciprocally
and identified basic need satisfaction as a key mechanism of this dynamic relationship. We believe this study provides an important first step for one of the main challenges for future innovation research, namely the adoption of a dynamic and reciprocal perspective on the innovation process.
REFERENCES


FOOTNOTES

¹A statistical justification for the aggregation of the two peer-ratings to a final IWB score for each participant is found in the intra-class correlation (ICC) between these two peer-ratings amounting to .33, which indicates an adequate level of agreement between the two raters (Bliese, 1998).

²The robustness of our analytical results were confirmed by using maximum likelihood estimates with robust standard errors, which are not affected by non-normally distributed data (i.e., MLM as implemented in the software package Mplus version 6.11; N = 76; see Table 3).

³The path analyses used in this study did not model shared variation at the group (i.e., case) level in addition to variation at the individual level. However, using the new Bayesian estimator implemented in Mplus (Asparouhov & Muthén, 2010), we derived a two-level path solution attesting to the stability of our key model results (i.e., mediation and reciprocal effect; see Table 4).
Table 3
Path coefficients as estimated in the elaborated model using robust maximum likelihood estimation in Mplus V6.11 (N = 76)

<table>
<thead>
<tr>
<th>STRUCTURAL RELATIONS</th>
<th>Day t</th>
<th>Day t+1</th>
<th>Day t+2</th>
<th>Day t+3</th>
<th>Day t+4</th>
<th>Day t+5</th>
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<tr>
<td>A: Effect of IWB (previous day) on BNS</td>
<td>N.A.</td>
<td>.13*</td>
<td>-.31**</td>
<td>.16**</td>
<td>.12*</td>
<td>.17**</td>
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<tr>
<td>Diagnosis: existence of a reciprocal effect</td>
<td>Not testable</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>B: Effect of BNS on IM</td>
<td>.62***</td>
<td>.59**</td>
<td>.40**</td>
<td>.41**</td>
<td>.23**</td>
<td>.40**</td>
</tr>
<tr>
<td>C: Effect of IM on IWB</td>
<td>.41**</td>
<td>.25**</td>
<td>.40**</td>
<td>.14*</td>
<td>.12*</td>
<td>-.14 (n.s.)</td>
</tr>
<tr>
<td>D: Effect of BNS on IWB</td>
<td>.02 (n.s.)</td>
<td>.09 (n.s.)</td>
<td>-.07 (n.s.)</td>
<td>.09 (n.s.)</td>
<td>.20**</td>
<td>.28**</td>
</tr>
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<td>Diagnosis: type of mediation: full mediation (B and C), partial mediation (B, C, and D), and no mediation (not B and/or not C)</td>
<td>Full</td>
<td>Full</td>
<td>Full</td>
<td>Full</td>
<td>Partial</td>
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<td>.76**</td>
<td>.61**</td>
<td>.54**</td>
<td>.37**</td>
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<td>.51**</td>
<td>.37**</td>
<td>.23**</td>
<td>.39**</td>
</tr>
<tr>
<td>Effect of IWB (previous day) on IWB</td>
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<td>.48**</td>
<td>.46**</td>
<td>.55**</td>
<td>.59**</td>
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<td>N.A.</td>
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<td>.49</td>
<td>.43</td>
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<td>IWB</td>
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<td>.45</td>
<td>.31</td>
<td>.45</td>
<td>.48</td>
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</tbody>
</table>

Note. \(^a\): Relationships as determined by the first-order autoregressive model
N.A. = not applicable (in the model), BNS = Basic Need Satisfaction, IM = Intrinsic Motivation, IWB = Innovative Work Behavior. *\( p < .10 \). **\( p < .05 \).
Table 3

Path coefficients as estimated in a two-level path model using hierarchical Bayes estimation as implemented in Mplus V6.11 (N = 76)

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 1+1</th>
<th>Day 1+2</th>
<th>Day 1+3</th>
<th>Day 1+4</th>
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<td><strong>STRUCTURAL RELATIONS</strong></td>
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</tr>
<tr>
<td>A: Effect of IWB (previous day) on BNS</td>
<td>N.A.</td>
<td>.19*</td>
<td>-.34**</td>
<td>.16**</td>
<td>.12*</td>
<td>.15**</td>
</tr>
<tr>
<td>Diagnosis: existence of a reciprocal effect</td>
<td>Not testable</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>B: Effect of BNS on IM</td>
<td>.80**</td>
<td>.62**</td>
<td>.47**</td>
<td>.43**</td>
<td>.36**</td>
<td>.53**</td>
</tr>
<tr>
<td>C: Effect of IM on IWB</td>
<td>.28**</td>
<td>.21**</td>
<td>.38**</td>
<td>.14*</td>
<td>.12*</td>
<td>-.11 (n.s.)</td>
</tr>
<tr>
<td>D: Effect of BNS on IWB</td>
<td>&lt;.01 (n.s.)</td>
<td>.09 (n.s.)</td>
<td>-.06 (n.s.)</td>
<td>.10 (n.s.)</td>
<td>.19**</td>
<td>.34**</td>
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<td>Diagnosis: type of mediation: full mediation (B and C), partial mediation (B, C, and D), and no mediation (not B and/or not C)</td>
<td>Full</td>
<td>Full</td>
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<td>No</td>
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<td><strong>STATISTICAL CONTROL</strong></td>
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<tr>
<td>Effect of BNS (previous day) on BNS</td>
<td>N.A.</td>
<td>.49**</td>
<td>.71**</td>
<td>.58**</td>
<td>.55**</td>
<td>.34**</td>
</tr>
<tr>
<td>Effect of IM (previous day) on IM</td>
<td>N.A.</td>
<td>.20**</td>
<td>.53**</td>
<td>.35**</td>
<td>.34**</td>
<td>.31**</td>
</tr>
<tr>
<td>Effect of IWB (previous day) on IWB</td>
<td>N.A.</td>
<td>.55**</td>
<td>.57**</td>
<td>.51**</td>
<td>.55**</td>
<td>.62**</td>
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</tbody>
</table>

*Note.* a: Relationships as determined by the first-order autoregressive model
N.A. = not applicable (in the model), BNS = Basic Need Satisfaction, IM = Intrinsic Motivation, IWB = Innovative Work Behavior.*p <.10. **p <.05.
CHAPTER 3

THE MOTIVATIONAL IMPACT OF DAY-LEVEL INNOVATIVE WORK BEHAVIOR: A SELF-DETERMINATION THEORY PERSPECTIVE.

ABSTRACT

Little research has been devoted to the psychological consequences of engaging in innovative work behavior. This is unfortunate as we lack knowledge on what the motivational costs and benefits can be of carrying out innovative activities. The current study advances basic need satisfaction as a beneficial motivational outcome of innovative work behavior and proposes two boundary conditions (i.e., perceived success and support for innovation), derived from self-determination theory, that may facilitate or hamper the motivational potential of innovative work behavior. A longitudinal field study (i.e., comprising a seven-day period) was carried out among 100 industrial product design and electronic engineering students which participated in an innovation boot camp. In support of our hypotheses, we found that perceived success and support for innovation were crucial enablers of the relationship between day-level innovative work behavior and experienced basic need satisfaction in the subsequent day. The present results yield useful suggestions for helping individuals that perform IWB to develop optimal motivation throughout innovation processes.

INTRODUCTION

The extent to which organizations reach their innovative potential, has been linked to the willingness of their employees to engage in the development of valuable ideas, socio-political efforts to obtain sufficient support for ideas, and ultimately the realization of these ideas (Janssen, 2000; Scott & Bruce, 1994; West & Farr, 1990; Yuan & Woodman, 2010). However, such innovative work behaviors are highly demanding and require the performance of complex activities which are not automatically followed by desired or anticipated outcomes (Axtell et al., 2000). For example, an engineer who spends much effort on the development of a new product might ultimately not see his or her concept brought to market if it is not economically feasible. This makes it very challenging for individuals that carry out innovative activities to maintain their energy and optimal motivation throughout an innovation process. Yet, research on the psychological consequences of innovative work behavior remains relatively underdeveloped.

The present chapter aims to deepen our current knowledge regarding the conditions under which individuals that engage in innovative work behavior (i.e., idea generation, promotion, and realization) are able to experience beneficial motivational outcomes. To do so, we build on the notion that individual perceptions, cognitions, and expectations are likely to be reshaped and altered as a result of one’s own innovative actions (Anderson, De Dreu, & Nijstad, 2004). This implies that undertaking innovative actions may spur but also impede motivational gains. The latter is problematic given the high degree of persistence, effort and recovery from setbacks that is needed when engaging in innovative endeavors (Bledow, Frese, Anderson, Miriam, & Farr, 2009; Moenkemeyer, Hoegl, & Weiss, 2012).

The underlying premise of this study is that the development of an optimal level of motivation throughout the course of an innovation process depends on the extent to which innovative work behavior stimulates positive motivational states. This resonates with a basic tenet of self-determination theory, namely that behavioral actions may yield motivational benefits if they allow individuals to satisfy three basic psychological needs (i.e., need for autonomy, competence, and relatedness) (Deci & Ryan, 2000). Basic need
satisfaction has been demonstrated to form the energetic basis for the development and maintenance of autonomous motivation; which is considered to be a key motivational state during innovation processes (Janssen & Van Yperen, 2004; Shalley, Gilson, & Blum, 2009; Shalley, Zhou, & Oldham, 2004). This implies that not being able to satisfy one’s basic psychological needs, is likely to obstruct the further development of autonomous motivation. Therefore, we propose to examine under which circumstances innovative work behavior is more likely to lead to subsequent basic need satisfaction. We advance two boundary conditions that indirectly and directly capture the experience of support, a psychological phenomenon that has been acknowledged by self-determination theory to influence the motivational potential of behavioral actions.

First, individuals who aim to bring about innovative change do not exclusively depend on their own behavioral efforts. Indeed, they also rely on the availability of sufficient resources, the supportiveness of their supervisor or the extent to which their co-workers resist change (e.g., Saunders, Sheppard, Knight, & Roth, 1992; West 2002; Madjar, Greenberg & Chen, 2011; Janssen, 2003). Hence, innovative work provides ample room for attributing past performance to internal (e.g., abilities or effort) or external causes (e.g., the environment). In this regard, self-determination theory posits that activities need to have an internal locus of causality to satisfy one’s basic psychological needs (Ryan & Deci, 2008). In line with previous work (Nickel & Spink, 2010), it is our contention that individuals who engage in innovative work behavior, but experience little success, will attribute their performance to the restraining influence of their work environment. However, individuals that perform innovative activities and also feel successful, will attribute performance to their own behavioral efforts. Thus, under conditions of low perceived success, it can be assumed that engaging in innovative work behavior will not be instrumental for satisfying basic psychological needs.

Second, in the present study we suggest that the broader environment not only affects innovative success but also gives meaning to one’s innovative efforts. In this regard, individuals who perceive that their environment supports innovative activities, are likely to feel that innovative initiatives are welcomed,
influential and meaningful (Scott & Bruce, 1994; Zhou & George, 2001). In contrast, low support for innovation signals that innovation is not desired and that their innovative efforts may have no use whatsoever. According to self-determination theory, this should impede the motivational benefits that are associated with innovative work behavior as it has been theorized that behavior only may engender basic need satisfaction if it is perceived to be meaningful and important (Ryan & Deci, 2008).

With this study, we aim to contribute to the literature concerning the psychological consequences of individual innovation. To do so, we draw from self-determination theory to propose two boundary conditions (i.e., perceived success and support for innovation) under which innovative work behavior is more likely to be associated with motivational benefits (i.e., subsequent basic need satisfaction). This way, we acknowledge the impact of indirect and direct perceptions of support on motivational gains during innovation processes and aim to provide insights on how the development of optimal motivational states can be efficiently managed.

THE MOTIVATIONAL POTENTIAL OF INNOVATIVE WORK BEHAVIOR

Innovative work behavior (IWB) can be described as the intentional generation, promotion and realization of new ideas within a role, group, or organization with the objective of benefiting role performance, the group or organization (Janssen, 2003; Scott & Bruce, 1994; West & Farr, 1990). This set of behavioral activities (i.e., idea generation, promotion, and realization) is considered to correspond with the different stages of an innovation life cycle. However, as innovations do not necessarily result from discrete, sequential stages but rather from discontinuous activities, individuals can be involved in any combination of these three behaviors at one point in time (Scott & Bruce, 1994). Individual innovative efforts can manifest itself at all levels of an organization, going from improved working methods concerning one’s own job, the implementation of new communication procedures to facilitate the coordination of activities within teams, to the development of products that can increase the overall competitive position of the organization in the market. In the
present study, we focus on the innovative work behavior of individuals participating in a product design training program.

During the past decades, most research on individual innovation has focused on the identification of those individual and contextual factors (and their interplay) which are conducive for the optimal motivation of individuals to achieve a high level of innovative performance (e.g., Janssen & Van Yperen, 2004; Kanter, 1988; Shalley et al., 2004). In this regard, cognitive evaluation theory has provided the conceptual base for the underlying motivational mechanisms that energize and direct IWB. This theory proposes that the quality of motivation can be understood as the extent to which behavior is intrinsically motivated (i.e., the desire to perform an activity or task in the absence of external contingencies or constraints) or extrinsically motivated (i.e., performing an activity because of an external outcome such as reward, recognition or obligation) (Ryan, 1982).

This conventional dichotomization of motivation (i.e., intrinsic versus extrinsic) has been refined within self-determination theory which has led to a more dynamic perspective on the development of motivational states within individuals. In particular, self-determination theorists have suggested that people have a natural tendency to transform or internalize social norms and new experiences into personally endorsed values and self-regulations (Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). Such internalization process is reflected by the degree to which external regulations are successfully integrated by the self; going from controlled motivation (i.e., experience of external pressure when engaging in activities) at one end of the continuum to autonomous motivation (i.e., experience of volition and free choice when engaging in activities) at the other end. Autonomous motivation (and intrinsic motivation as its highest form) has been acknowledged as one of the key ingredients in creativity and innovation, because under these conditions individuals are more likely to explore original perspectives on problems, to process new information more efficiently, to take risks, and stay more focused on pending innovative tasks or challenges (Amabile, 1988; Grant & Berry, 2011; Hammond, Neff, Farr, Schwall, & Zhao, 2011; Oldham & Cummings, 1996; Shalley, 1991).
However, despite the importance of this intrinsic motivation perspective as a motivational driver of IWB, current theoretical and empirical developments suggest that by exclusively focusing on the motivational antecedents of innovation, the dynamic nature of innovative processes are largely overlooked (Anderson et al., 2004). In this regard, Janssen and colleagues (2004) have argued that innovation research is in need of the systematic development of research models depicting IWB as an independent variable rather than a dependent variable, and highlighted the need to investigate those factors that regulate the beneficial and costly psychological outcomes of individual innovation.

In the present study, we adopt this approach as we address the consequences of engaging in innovative work behavior for subsequent motivational states. More specifically, we seek to examine under which circumstances people that engage in IWB, are more likely to experience enhanced motivation. The assumption that behavior may yield motivational benefits, is grounded in self-determination theory which posits that engaging in behavior may lead to the combined satisfaction of three innate psychological needs; need for autonomy (i.e., exercise control over one’s actions), need for competence (i.e., feeling able to execute tasks), and need for relatedness (i.e., feel supported by the social environment) (Deci et al., 2001; Deci, Ryan, & Williams, 1996; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). In this regard, basic need satisfaction has been advanced as a crucial condition for the maintenance and development of autonomous motivation (Ryan & Deci, 2000; Van Den Broeck et al., 2009).

It is our contention that the extent to which IWB can stimulate the development of optimal motivation, depends on whether this behavior leads to subsequent basic need satisfaction. IWB has been argued to be a typical form of proactive work behavior as it comprises efforts to take control of, and to bring about change within the internal work environment (e.g., improving current work methods or influencing the jobs of colleagues) (Parker & Collins, 2008). It has been proposed by Strauss and Parker (in press) that proactive behavior is an effective way to satisfy one’s psychological needs for autonomy, competence and relatedness, especially because this type of behavior is self-initiated,
The Motivational Impact of Day-level Innovative Work Behavior

Involves the pursuit of challenging goals, and is often socially oriented. In line with this reasoning, we suggest that IWB may create opportunities for individuals to satisfy their basic psychological needs, for example by actively seeking for new ways to do things (fulfilling one’s need for autonomy), by interacting with key actors of the environment to promote ideas (fulfilling one’s need for relatedness) or by putting ideas to work (fulfilling one’s need for competence).

However, innovation is by definition a social process and therefore is strongly affected by contextual factors. For example, without the support, cooperation or consent from other key actors in the work environment, IWB is unlikely to be associated with positive outcomes (Janssen et al., 2004; Rank, Pace, & Frese, 2004). Therefore, we argue that the potential effect of IWB on subsequent basic need satisfaction will also be contingent on the support that individuals receive from the environment when carrying out innovative activities. In this regard, the importance of the broader environment in regulating the (positive and negative) psychological outcomes of IWB has been demonstrated in previous research. For example, Janssen (2004) found that IWB was associated with negative psychological outcomes such as job-related anxiety and burnout, but only if employees perceived that their innovative efforts were not fairly rewarded by their organization, and that unfair procedures were applied to determine their investments and rewards.

In the following paragraphs, we will propose two boundary conditions under which IWB is more likely to influence subsequent basic need satisfaction. Both conditions indirectly or directly comprise psychological perceptions of support and have been advanced by self-determination theorists as important facilitators of basic psychological need satisfaction; namely perceived success and support for innovation.

**The Moderating Role of Perceived Success**

With perceived success we refer to the extent to which individuals feel they have attained desired behavioral outcomes with regards to their innovative efforts. Several motivational theories have been employed to explore how perceptions of progress or success may affect personal well-being. For example,
social cognitive theory considers successful performance to be conducive for the confidence in one’s abilities to perform certain activities (Bandura, 1997; Shim & Ryan, 2005; Tierney & Farmer, 2002). Other theoretical traditions such as goal setting theory and expectancy theory of motivation have posited that the successful attainment of goals is positively associated with self and task satisfaction, and establishes a stable basis for future activities by creating expectations that such outcomes will be repeated (Locke & Latham, 1990; Vroom, 1964).

Given the many factors (e.g., group and organizational characteristics) that may affect an innovation process, there is not necessarily a one-to-one relationship between the extent to which individuals actively engage in IWB and how successful their innovative activities will be (Axtell et al., 2000). As IWB not only implies substantial cognitive but also socio-political efforts, innovators need to interact with their social environment to obtain relevant knowledge, support or resources to pursue their innovative goals (Kanter, 1988). In other words, innovative success is context-dependent and is more likely to occur when innovation attempts are facilitated by the broader social environment (Janssen et al., 2004; Mumford, Scott, Gaddis, & Strange, 2002; Shalley & Gilson, 2004).

It is our contention that perceived success is a crucial enabler of the motivational potential of IWB. More specifically, we expect that individuals who perform IWB only will experience increased basic need satisfaction when they feel successful in their innovative attempts. Previous research in social psychology shows that individuals have a tendency to attribute success to personally controllable characteristics, whereas failure is attributed to situational or ad-hoc causes (Nickel & Spink, 2010). In a similar vein, we theorize that if people perceive that their attempts to pursue innovative change not appreciably affect outcomes, they are likely to experience a loss of self-determination or control over their own behavior. From the standpoint of self-determination theory, this sense of loss of control will thwart the satisfaction of the psychological need for autonomy (e.g., unsuccessful attempts to pursue one’s own ideas), relatedness (e.g., unsuccessful attempts to enthuse or benefit others with new ideas), and competence (e.g., unsuccessful attempts to implement
ideas) (Deci & Ryan, 2000). Consequently, under these circumstances IWB is not expected to be associated with basic need satisfaction. The above-mentioned arguments are in agreement with previous empirical evidence indicating that autonomous behavior (i.e., pursuing self-determined goals) in concert with perceptions of success (i.e., goal attainment) are more likely to satisfy one’s basic psychological needs and consequently psychological well-being (e.g., Sheldon & Elliot, 1999). Furthermore, Sheldon and Kasser (1998) studied the motivational consequences of making progress at self-determined goals and found that this interaction predicted increases in psychological well-being of students in both short- (i.e., 5-day interval) and long term (i.e., semester).

In the present study, we have adopted a short-term (i.e., day-level) approach to longitudinally examine the interaction between IWB and perceived success on subsequent basic need satisfaction. Our line of reasoning about perceived success as a boundary condition of the relationship between IWB and subsequent need satisfaction, leads to the following hypothesis:

**Hypothesis 1:** Day-level IWB and perceived success interact to positively affect next day’s basic need satisfaction in such a way that IWB will have the strongest relationship with lagged basic need satisfaction in case of high levels of perceived success.

**THE MODERATING ROLE OF SUPPORT FOR INNOVATION**

Support for innovation captures the extent to which the direct work environment is seen as supportive and encouraging of efforts to introduce and apply new and improved ways of doing things (Scott & Bruce, 1994; West & Farr, 1990). So far, support of innovation mainly has been approached as a contextual antecedent of creativity and IWB. More specifically, individuals who receive strong support for innovation experience a psychological safe climate that allows and stimulates them to propose, discuss and develop new ideas (Binnewies, Ohly, & Sonnentag, 2007; West, 2002). However, work environments that support innovation not only legitimize experimentation and risk-taking but have also been argued to send a clear signal that innovative
efforts are valued and are meaningful (Baer & Oldham, 2006; Scott & Bruce, 1994; Zhou & George, 2001).

Building on this logic, we suggest that the context, in which individuals perform IWB, may reinforce or refute the psychological meaning and value that individuals ascribe to their innovative efforts. Environments that provide strong support for innovation will help individuals in finding a sense of purpose and meaning in their previous innovative efforts. In contrast, individuals that engage in IWB, but simultaneously experience little support for innovation in their direct environment, might lead them to devalue the importance of their activities. This makes it less likely that innovation will be perceived as a meaningful aspect of their work. The latter situation should prevent individuals from satisfying their basic psychological needs. In this regard, self-determination posits that meaningful activities are the key for basic need satisfaction, and in turn lead to the maintenance and enhancement of vitality (Reis et al., 2000; Ryan & Deci, 2008). Hence, we assume that IWB will be less likely considered as a fruitful way to satisfy one’s need for autonomy, relatedness and competence when it is conducted in an environment that does not value and support innovation. Consequently, under these circumstances, the positive relationship between IWB and subsequent basic need satisfaction is unlikely to occur.

Hypothesis 2: Day-level IWB and support for innovation interact to positively affect next day’s basic need satisfaction in such a way that IWB will have the strongest relationship with lagged basic need satisfaction in case of strong support for innovation.

METHOD

SAMPLE AND PROCEDURE

A longitudinal field study (i.e., comprising a seven-day period) was carried out among a group of students from several European universities that were involved in an international innovation training program at the time of assessment. More specifically, our sample consisted of 108 students in industrial
product design and electronic engineering that participated in an innovation boot camp with the aim of developing their innovation and entrepreneurial skills as future R&D professionals. Because 8 students dropped out during the program, our final sample consisted of 100 students of which 75% were men. Their mean age was 21.79 years (SD = 2.23). At the start of the innovation boot camp, participants were assigned to work on a real-life industrial case, provided by innovation managers of various collaborating organizations. All industrial cases required the development of a green and eco-friendly product or prototype and therefore implied the engagement in a product innovation process. Throughout the entire course of the innovation boot camp, participants had the opportunity to interact with their colleagues, instructors and the organization that had provided their case. Furthermore, the prototypes and concepts that were developed by the participants of this innovation program could be adopted by the collaborating organizations. This illustrates the professional and realistic nature of this innovation program which should contribute to the external validity of our study.

At the beginning of the innovation boot camp, participants were informed about the purpose of the current survey study and were told that this investigation was part of a project with the objective to capture psychological experiences throughout the course of a product innovation process. Demographic information of each participant was provided by their university. Participants were asked to complete a web-based diary questionnaire for seven consecutive days, at the end of each training day. Although surveys were not anonymous (i.e., all daily reports had to be matched with the corresponding participant), complete confidentiality of the data was guaranteed to all participants. In total, 648 reports were collected from 100 participants over a period of 7 days. On average, participants filled out the web-based questionnaire 6.5 times (SD = .87).

**MEASURES**

The daily questionnaire that participants had to complete at the end of each day, focused on the activities they carried out throughout the day with
regard to their assigned industrial case. All survey items were formulated in English as this was the common language used by all participants and trainers.

**Innovative work behavior (IWB).** We measured daily levels of ‘innovative work behavior’ with a nine-item scale by Janssen (2000). The three dimensions of IWB (i.e., idea generation, idea promotion and idea realization) were included and respondents were asked to indicate how often they conducted these innovative work behaviors during the day. Sample items are ‘Create new ideas for difficult issues regarding your case’ (idea generation); ‘Mobilize support for innovative ideas’ (idea promotion); ‘Transform innovative ideas into useful applications’ (idea realization). The answers were scored on a seven-point anchored Likert scale ranging from 1 = never to 7 = always. IWB was operationalized as the mean score of its indicators. Across all occasions, coefficients alpha of this scale’s ratings was .93.

**Basic need satisfaction.** We measured daily levels of ‘basic need satisfaction’ with 10 items from the scale of Van Den Broeck and colleagues (2009). Sample items are ‘The tasks, activities that I had to do today, are in line with what I really want to do’ (autonomy); ‘Today, I felt competent’ (competence); ‘Today, I felt part of a group/team’ (relatedness). The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree. Basic need satisfaction was operationalized as the mean score of its indicators. Across all occasions, coefficients alpha of this scale’s ratings was .93.

**Perceived success.** We measured daily levels of ‘perceived success’ with 3 items that were developed for the purpose of this study. Items are ‘To what extent did you feel successful regarding your innovative activities today?’; ‘To what extent were you effective in your innovative actions today?’; ‘To what extent do you feel satisfied with the outcome of your innovative activities today?’ . The answers were scored on a seven-point anchored Likert scale ranging from 1 = not at all to 7 = to a very large extent. Perceived success was operationalized as the mean score of its indicators. Across all occasions, coefficients alpha of this scale’s ratings was .91.

**Support for innovation.** We measured daily levels of ‘support for innovation’ with 3 items from the scale of Scott and Bruce (1994). A sample
item is ‘Today, our ability to function creatively was respected and appreciated by the people in charge’. The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree. Support for innovation was operationalized as the mean score of its indicators. Across all occasions, coefficients alpha of this scale’s ratings was .83.

**ANALYTICAL APPROACH**

Means, standard deviations, Cronbach’s alpha coefficients and bivariate correlations were obtained for all scales. First, to verify whether the indicators had loadings on their intended latent factor, a confirmatory factor analysis was performed for the measurement model using scores centered at the person mean (Sonnentag & Jelden, 2009). To assess the adequacy of a multi-factor model, it is common practice to compare this multi-factor model with a single factor model (e.g., Caprara, Pastorelli, Regalia, Scabini, & Bandura, 2005). Following Caprara and colleagues (2005), we tested three different models: (1) a one-factor model which assumed that all constructs were the expression of one single latent factor (i.e., all the covariances were fixed at 1); (2) a four-factor orthogonal model in which all constructs are independent (i.e., all the covariances were fixed at 0); and (3) a four-factor oblique model in which all factors are interrelated (i.e., all the covariances were freely estimated).

Second, because our dataset exists of repeated daily measurements \(N = 648\) nested within 100 individuals, we employed hierarchical linear modeling (HLM 6) to test all hypotheses of this study. To investigate the hypothesized lagged interactions, we temporally separated the dependent variable ‘basic need satisfaction’ by one survey period (time t+1; being the subsequent day). Consequently, the total sample size on which we tested our hypotheses was reduced from 648 to 526 observations (i.e., note that scores were not lagged across non-consecutive observations). We also controlled for serial dependence in the dependent variable measure (i.e., basic need satisfaction), and specified an autoregressive baseline model including basic need satisfaction measured at the previous day. This way, daily changes in basic need satisfaction could be accounted for. All variables were assessed at level 1 and centered around the sample’s mean (Fritz & Sonnentag, 2007). To test the hypothesized moderation
effect of daily perceived success (Hypothesis 1) and support for innovation (Hypothesis 2) on the lagged relationship between daily IWB and subsequent basic need satisfaction, we specified a series of nested multilevel models. In model 1 we entered the previous day’s level of the dependent level (i.e., basic need satisfaction) and the main effects of IWB and each moderator; and in Model 2 we entered their two-way interaction term.

**RESULTS**

The means, standard deviations, Cronbach’s alpha coefficients and intercorrelations among the study variables are summarized in Table 1. All Cronbach’s alpha coefficients meet the criterion value of .70 (i.e., ranging from .83 to .93).

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>α</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Day-level IWB</td>
<td>4.60</td>
<td>0.92</td>
<td>.93</td>
<td>.64**</td>
<td>.34**</td>
<td>.27**</td>
</tr>
<tr>
<td>2. Day-level perceived success</td>
<td>4.72</td>
<td>1.06</td>
<td>.91</td>
<td>.74**</td>
<td>.49**</td>
<td>.34**</td>
</tr>
<tr>
<td>3. Day-level support for innovation</td>
<td>5.02</td>
<td>0.97</td>
<td>.83</td>
<td>.47**</td>
<td>.61**</td>
<td>.41**</td>
</tr>
<tr>
<td>4. Day-level BNS (day t+1)</td>
<td>4.86</td>
<td>0.83</td>
<td>.85</td>
<td>.53**</td>
<td>.71**</td>
<td>.75**</td>
</tr>
</tbody>
</table>

Note. Correlations below the diagonal represent the between-person level (N = 100). To calculate between-person correlations, variables were aggregated across occasions. Correlations above the diagonal represent the within-person level (N = 526). *p < .05; **p < .01.

Table 2 contains the results of the confirmatory factor analysis of our measures. The chi-square (χ2) of all the tested models was statistically significant; the oblique model shows the best fit indices (see AIC; Akaike, 1987) and meet the criteria, χ2 (262, N = 526) = 764.00, p < .001 (GFI = .91; AGFI = .89; RMSEA = .06; CFI = .89; IFI = .89; TLI = .87; AIC = 890.00). These results suggest that IWB, perceived success, support for innovation, and basic need satisfaction are interrelated, yet distinct constructs on a daily level.
Table 3 includes the multi-level estimates of the hypothesized interaction models. Hypothesis 1 predicted that perceived success moderates the lagged relationship between day-level IWB and next day’s basic need satisfaction. In line with what we expected, results indicate that the interaction between day-level IWB and perceived success is significant as a predictor of subsequent day-level basic need satisfaction (Model 2; $\gamma = 0.07, SE = .02, p < .01$), explaining 4% of the variance above and beyond the previous model (Model 1 including previous day’s level of basic need satisfaction and the main effects of IWB and perceived success).

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>CFI</th>
<th>IFI</th>
<th>TLI</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unique factor model</td>
<td>1389.39</td>
<td>267</td>
<td>.87</td>
<td>.84</td>
<td>.09</td>
<td>.75</td>
<td>.75</td>
<td>.72</td>
<td>1505.39</td>
</tr>
<tr>
<td>2. Orthogonal model</td>
<td>1022.26</td>
<td>267</td>
<td>.88</td>
<td>.86</td>
<td>.07</td>
<td>.83</td>
<td>.84</td>
<td>.81</td>
<td>1138.26</td>
</tr>
<tr>
<td>3. Oblique model</td>
<td>764.00</td>
<td>262</td>
<td>.91</td>
<td>.89</td>
<td>.06</td>
<td>.89</td>
<td>.89</td>
<td>.87</td>
<td>890.00</td>
</tr>
</tbody>
</table>

Note. $\chi^2 =$ Chi-square; df = degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC = Akaike Information Criterion.
### Table 3

**HLM estimates of the hypothesized interactive effects on next day’s basic need satisfaction (day t+1)**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Model 2&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Model 1&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Model 2&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.81 (0.04)**</td>
<td>4.78 (0.04)**</td>
<td>4.81 (0.04)**</td>
<td>4.80 (0.03)**</td>
</tr>
<tr>
<td>Previous level basic need satisfaction</td>
<td>0.36 (0.05)**</td>
<td>0.38 (0.05)**</td>
<td>0.31 (0.05)**</td>
<td>0.32 (0.05)**</td>
</tr>
<tr>
<td>Day-level IWB</td>
<td>0.06 (0.05)</td>
<td>0.06 (0.05)</td>
<td>0.04 (0.05)</td>
<td>0.04 (0.05)**</td>
</tr>
<tr>
<td>Day-level perceived success</td>
<td>-0.04 (0.05)</td>
<td>-0.01 (0.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Day-level support for innovation</td>
<td></td>
<td></td>
<td>0.12 (0.04)**</td>
<td>0.15 (0.04)**</td>
</tr>
<tr>
<td>Day-level IWB x perceived success</td>
<td></td>
<td></td>
<td>0.07 (0.02)**</td>
<td></td>
</tr>
<tr>
<td>Day-level IWB x support for innovation</td>
<td></td>
<td></td>
<td></td>
<td>0.10 (0.03)**</td>
</tr>
</tbody>
</table>

Δ\(R^2\) = .35 .04 .37 .01

**Note.** \(N = 526\) observations nested within 100 individuals. Next day’s Basic Need Satisfaction is the dependent variable. All predictors are Level 1 variables. Values are unstandardized regression coefficients (\(\beta\)). Standard errors are indicated in parentheses. 

<sup>a</sup> Moderation analysis with perceived success (Hypothesis 1).

<sup>b</sup> Moderation analysis with support for innovation (Hypothesis 2). \(\Delta R^2 = \) Variance explained over and above the variance explained by the previous model. Model 1 was compared with the null model. *\(p < .05\); **\(p < .01\).
Figure 1 depicts this interaction effect. An inspection of Figure 1 indicates that the relationship between day-level IWB and lagged basic need satisfaction was positive in case of high levels of perceived success, but not when perceived success was low. To further explore this interaction pattern, a simple slope test was performed according to the procedure of Preacher, Curran and Bauer (2006). This simple slope test confirmed that on days when people perceived high levels of success (one $SD$ above the mean), day-level IWB was positively related with next day’s basic need satisfaction ($\gamma = 0.13$, $SE = 0.06$; $z = 2.24$; $p < .01$), but on days when people perceived low levels of success (one $SD$ below the mean), IWB was not related with next day’s basic need satisfaction ($\gamma = -0.02$, $SE = 0.05$; $z = -0.30$; ns).

![Figure 1. Interaction effect of day-level innovative work behavior (IWB) and perceived success on next day’s basic need satisfaction (Hypothesis 1)](image-url)
Hypothesis 2 predicted that support for innovation moderates the lagged relationship between day-level IWB and next day’s basic need satisfaction. As hypothesized, results indicate that the interaction between day-level IWB and support for innovation is significantly related with next day’s basic need satisfaction ($\gamma = 0.10, SE = .03, p < .01$), explaining 1% of the variance above and beyond the previous model (Model 1 including previous day’s level of basic need satisfaction and the main effects of IWB and support for innovation). Figure 2 depicts this interaction effect. As hypothesized, the relationship between day-level IWB and next-day’s basic need satisfaction was only positive when support for innovation was strong. Additionally, a simple slope test revealed that on days when individuals experienced strong support for innovation (one $SD$ above the mean), day-level IWB was positively related with next day’s basic need satisfaction ($\gamma = 0.14, SE = 0.05; z = 2.61; p < .01$), but on days when individuals experienced weak support for innovation (one $SD$ below the mean), IWB was not significantly related with next day’s basic need satisfaction ($\gamma = -0.06, SE = 0.05; z = -1.11; ns$).

![Image](image_url)

Figure 2. Interaction effect of day-level innovative work behavior (IWB) and support for innovation on next day’s basic need satisfaction (Hypothesis 2)
**DISCUSSION**

Over the last decade, researchers have drawn attention to the dynamic nature of innovation processes by arguing that performing IWB leads to a variety of psychological consequences such as the development of job attitudes, well-being or stress (Anderson et al., 2004; Janssen et al., 2004; Janssen, 2003; Janssen, 2004). The present study set out to investigate the consequences of engaging in IWB for subsequent motivational states and to elucidate the boundary conditions under which IWB is more likely to be associated with motivational benefits in terms of subsequent basic need satisfaction.

**THEORETICAL IMPLICATIONS**

The present study is a step beyond previous research which mainly has considered motivational states as a starting point for innovative action (e.g., Amabile, 1988; Michael, Hou, & Fan, 2011; Scott & Bruce, 1994; Yuan & Woodman, 2010). Although this line of research has been crucial for our understanding of the antecedents that may instigate favorable motivational states for IWB (i.e., autonomous motivation), it remains unclear how optimal motivation can be enhanced throughout an innovation cycle. By addressing the motivational consequences of IWB, the present study provides a different framework to approach the motivation-IWB relationship. This framework highlights the potential of IWB to satisfy one’s basic psychological needs (i.e., autonomy, relatedness, competence). This should be particularly important for the development of subsequent motivational states, as self-determination theory posits that autonomous motivation is nurtured by the combined satisfaction of these three basic needs (Deci & Ryan, 2000).

A test of hypotheses derived from self-determination theory revealed that although IWB may result in motivational benefits, this will be contingent on specific boundary conditions. Consistent with Hypothesis 1, we found that a lack of perceived success hampered the potential of IWB to satisfy the need for autonomy, relatedness and competence. Furthermore, we found support for Hypothesis 2, as we observed that people that perform IWB also need to experience sufficient support for innovation to satisfy their basic needs. Our findings attest to the social nature of innovation processes, implying that
innovative activities are subject to factors that exceed one’s behavioral intentions and efforts, such as perceptions of support (Axtell et al., 2000; Shalley et al., 2004). Taken together, this study complements previous innovation research that has focused on the motivational underpinnings of innovation processes by extending theoretical knowledge on how and when individuals that engage in IWB may subsequently experience optimal levels of motivation. By integrating aspects from self-determination theory in the present study we were able to make specific predictions regarding the circumstances under which basic psychological needs are more likely to be satisfied. This way, we have established a self-determination theory framework that can help future innovation studies to identify new boundary conditions that may facilitate or impede the motivational benefits of IWB.

**PRACTICAL IMPLICATIONS**

Managers and other practitioners often come to the conclusion that in spite of their efforts to stimulate individual innovation (e.g., by employee suggestion systems, creativity training sessions, or organizational reward programs), employees are not always able to preserve their initial motivation and energy after performing innovative activities. For example, employees who try to change well-established working methods may be confronted with hostile reactions from their colleagues and thus, as a result of their innovative efforts, run the risk of discouragement and disillusionment. Therefore, interventions or practices that exclusively focus on providing an initial motivational trigger that may lead to innovative efforts, but neglect the motivational consequences of IWB, are unlikely to be effective in the long term. There are a number of practical recommendations that can be derived from our research for maximizing the motivational benefits of IWB, which in turn should facilitate the development of optimal motivation.

First, as innovative success or failure does not entirely depend on the innovative efforts of individuals, innovators run the risk of losing their sense of self-determination along the way. Our results indicate that this might undermine the potential of IWB to satisfy one’s basic needs. Therefore, in case of unsuccessful attempts to innovate, people could be encouraged to reflect on their
own performance by which they should be less tempted to exclusively attribute their failures to external factors (Carette & Anseel, 2012). This way, unsuccessful IWB would become informative and could therefore provide learning opportunities for subsequent behavioral attempts, highlighting new routes that lead to need satisfaction and revitalized energy.

Furthermore, our findings imply that considerable and frequent efforts should be undertaken to establish positive daily perceptions of support for innovation, as it helps individuals to draw motivation from their past innovative efforts. In this regard, an emerging body of research highlights the crucial role of direct supervisors in signaling such support as they are expected to respond to and evaluate new ideas and initiatives voiced by employees (e.g., Eisenbeiss, Van Knippenberg, & Boerner, 2008; Michaelis, Stegmaier, & Sonntag, 2010).

**LIMITATIONS AND FUTURE RESEARCH**

One limitation of the current study is that our findings are based on self-ratings of IWB. Due to their subjectivity, such self-ratings may be biased which can lead to an inflation of observed correlations (Harris & Schaubroeck, 1988; Janssen & Van der Vegt, 2011). In the current setting, more objective indicators of individual innovation were hard to come by given that we focused on daily levels of IWB that not always resulted in output that could be externally assessed. However, to reduce the threat of common-method bias, the independent and dependent variable were separated by one time-lag in our analysis.

Second, our study has adopted a less conventional research model as our criterion variable (i.e., basic need satisfaction) reflects a cognitive motivational appraisal rather than actual behavior. However, this does not imply that our dependent variable would be a less relevant construct as several studies have pointed to the importance of basic need satisfaction, for example by demonstrating a clear association with supervisor-ratings of work performance (e.g., Baard, Deci, & Ryan, 2004; Greguras & Diefendorff, 2009, 2010; Leroy, Anseel, Gardner, & Sels, in press).

Another potential limitation of this study is that all data was collected on students, which calls for caution in interpreting and generalizing our findings.
However, it should be underscored that our sample did not consist of psychology students, a sample that can be criticized for being too familiar with psychological survey assessments. In fact, the current study was conducted among industrial product design and engineering students that provided innovative solutions on real problems that organizations were struggling with. Nonetheless, it is important for future research to replicate our findings in an organizational setting with non-student samples.

Finally, by studying the motivational consequences of IWB at a day-level, we cannot draw conclusions concerning the long-term effect that IWB may have on more stable motivational styles. Hence, future research could verify whether the assumptions of the current study still hold when using a different time-frame (i.e., in terms of weeks or months). Furthermore, it can be expected that a long-term perspective should reveal the presence of other boundary conditions that are less susceptible to momentary fluctuations (e.g., organizational climate or team characteristics).

**CONCLUSION**

Although innovation research has devoted much attention to the motivational underpinnings of innovation processes, little theory and empirical evidence exists to explain the motivational consequences of engaging in IWB. In the present study we have adopted a self-determination perspective to deepen knowledge on the boundary conditions under which IWB is more likely to be associated with motivational benefits in terms of basic psychological needs satisfaction. Based on our findings, we can tentatively conclude that the potential of IWB to satisfy subsequent basic needs, is contingent on indirect and direct perceptions of support for innovation. For organizations, this implies that efficiently stimulating IWB does not only depend on providing an initial motivational trigger. In addition, sufficient effort should be made to create a supportive environment for innovation which enables the motivational benefits that result from engaging in IWB.
The Motivational Impact of Day-level Innovative Work Behavior

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CHAPTER 4

WHEN CREATIVE SELF-EFFICACY MAKES THE DIFFERENCE: A WITHIN-PERSON APPROACH ON THE PURSUIT OF RADICAL AND INCREMENTAL IDEAS.

ABSTRACT

In the present study, we investigated the dynamic relationship between momentary levels of creative self-efficacy and two types of creativity; namely radical and incremental creativity. Building on research that highlights the impact of creative self-efficacy on creative performance through cognitive flexibility as well as persistence, we hypothesized that the unique relationship between week-level creative self-efficacy and both types of creativity is subject to different boundary conditions. Using a within-person design, we conducted a week-level study with 35 final year students in industrial product design involved in an industrial prototyping project over 14 weeks. Participants completed weekly online surveys at the end of each week. As expected, hierarchical linear modeling indicated that strong feelings of psychological idea ownership impeded the lagged relationship between week-level creative self-efficacy and radical creativity. Furthermore, we found that the extent to which individuals expect that their creative efforts will lead to desirable outcomes (e.g., reputational benefits), strengthened the lagged relationship between week-level creative self-efficacy and incremental creativity. These results suggest that the distinction between radical and incremental creativity is important when aiming to facilitate individual creativity through creative self-efficacy development programs.

INTRODUCTION

Over the past decade, a broad range of organizations and industries have become increasingly interested in exploring and developing the creative potential of their workforce as a source for innovation. Creative employees are highly valued as companies are in constant need of new ideas to improve their business, providing them with a competitive advantage and a solid foundation for sustainable growth and success (George & Zhou, 2002; Hirst, Van Knippenberg, & Zhou, 2009; Oldham & Cummings, 1996). Consequently, the focus has shifted from a mere demand for technical and job specific competencies, to employees who also posses creative thinking abilities, who are willing to challenge the status-quo and can create opportunities that benefit their organization. Apart from the efforts that organizations can undertake to encourage a creative mindset among their employees, the role of education should neither be overlooked nor underestimated. Given that many universities and business schools have started to formally incorporate entrepreneurship education in their curricula to answer the organizational demands for creative professionals, a good understanding how to stimulate individual creativity has become a priority for educators as well (Boni, Weingart, & Evenson, 2009).

A promising strategy to foster individual creativity is the formation and development of individuals’ creative self-efficacy. This construct originates from social cognitive theory and refers to the beliefs that people hold concerning their capacity to produce creative outcomes (Tierney & Farmer, 2002). Creative self-efficacy is found to positively influence one’s creative performance, and has mainly been advanced as an underlying motivational mechanism to explain the effects of several contextual and individual antecedents of individual creativity (e.g., Choi, 2012; Gong, Huang, & Farh, 2009). In this regard, there is a growing body of research that has provided compelling evidence for the assumption that between-person differences in creative self-efficacy are substantially related to one’s creative performance (e.g., Beghetto, Kaufman, & Baxter, 2011; Gong et al., 2009; Richter, Hirst, van Knippenberg, & Baer, 2012; Tierney & Farmer, 2002). Although these studies have made a strong case for the predictive role of creative self-efficacy on individual creative success, they have overlooked the theoretical claims concerning the dynamic nature of self-efficacy beliefs (e.g.,
When Creative Self-Efficacy Makes the Difference

gradual development through past experiences; Bandura, 1977). Between-person approaches typically treat creative self-efficacy rather as a static individual difference. Unfortunately, this approach has difficulties to explain intra-individual variability in creativity and the processes that may be responsible for this variation. For instance, even creative self-efficacious individuals may have weeks during which they produce less creative outcomes than they generally are able to do. Furthermore, a better understanding of the conditions under which increased levels of creative self-efficacy are more likely to facilitate creativity, would be instrumental for educators and organizations for supporting individuals to perform at an optimal level of creativity. Hence, to account for the temporal variation in the relationship between creative self-efficacy and creativity, variance across time and situations seems more relevant (i.e., within-individual variation) than variance across individuals (i.e., between-individual variance).

The present study aims to expand previous literature by exploring within-person relations between creative self-efficacy and individual creativity across time. To do so, we investigate the lagged relationship between week-level creative self-efficacy and creative idea production among individuals involved in a relatively long-term industrial product design project within an academic context. Furthermore, we make an explicit distinction between the generation of ideas that yield rather incremental improvements versus radical breakthroughs (e.g., Gilson, Lim, D’Innocenzo, & Moye, 2012; Madjar, Greenberg, & Chen, 2011). As creative self-efficacy has been proposed to lead to creative achievements through two separate processes, namely an explorative (i.e., information seeking) as well as an exploitation route (i.e., sustained effort and persistence) (e.g., Richter et al., 2012; Tierney & Farmer, 2002), we will argue that the unique relationship between week-level creative self-efficacy and both types of creativity will also be subject to two different boundary conditions. More specifically, we propose that strong feelings of psychological idea ownership impede the relationship between week-level creative self-efficacy and subsequent radical creativity. The rationale for this interaction is that psychological idea ownership may elicit territoriality and protective attitudes (Baer & Brown, 2012; Brown, Lawrence, & Robinson, 2005), thus restricting
external informational input that individuals could use to generate highly original, radical ideas. In contrast, incremental creativity has been argued to depend less on intrinsic interest, cognitive flexibility or divergent information seeking but is affected rather by external drivers as a key motivational force (Gilson et al., 2012; Gilson & Madjar, 2011). Therefore, we propose that week-level creative self-efficacy will be more likely to be associated with subsequent incremental creativity, when individuals expect that their creative efforts will lead to desirable outcomes. This argument follows from the observation that outcome expectancy stimulates resilience and perseverance when engaging in creative and innovative activities (Baer, 2012; Moenkmeyer, Hoegl, & Weiss, 2012; Yuan & Woodman, 2010). Thus, the theoretical choice for two different moderators modulating the effects on incremental and radical creativity builds on previous conceptual work delineating two different mechanisms through which creative self-efficacy affects creativity.

The results of this study are intended to have a number of theoretical and practical implications: First, by providing a theoretical rationale which explains how creative self-efficacy is uniquely associated with two different forms of creativity (i.e., radical and incremental creativity), we build on previous creativity research that has addressed the importance of cognitive flexibility as well as persistence to achieve creative outcomes. Second, by testing psychological idea ownership and outcome expectancy as two boundary conditions that facilitate or impede exploratory or exploitative processes, we aim to increase our understanding how creative self-efficacy can be employed more efficiently to obtain specific creative outcomes at the individual level. Finally, by using a repeated measures, within-subjects design, we seek to investigate whether individuals’ weekly levels of creative self-efficacy and creative performance fluctuate over time. This is a welcome addition to the literature, which has mainly focused on between-person variance in explaining the effects of creative self-efficacy.

**THEORETICAL BACKGROUND AND HYPOTHESES**

Creative self-efficacy (CSE), a domain-specific application of the self-efficacy concept to creative behavior, is a construct embedded in social
cognitive theory (Bandura, 1986). It advances that the beliefs people have about their ability to perform particular activities and to exercise control on their environment, influences the extent to which they set challenging goals and the amount of cognitive and motivational resources they mobilize to pursue these goals (Bandura, 1991; Gist & Mitchell, 1992). Importantly, self-efficacy beliefs are related to specific performance domains and should therefore be distinguished from general self-confidence (Bandura, 1997). Hence, individuals may experience strong levels of self-efficacy for a particular activity, but not in regard to other activities. Tierney and Farmer (2002) posited that efficacy beliefs regarding one’s creative abilities (i.e., CSE) are an important determinant for individual creativity. Creativity is most often described as the production of ideas concerning products, processes or services that are novel and useful (Amabile, 1996). Furthermore, creative idea generation is considered to be the initial stage of a broader organizational innovation process which eventually should lead to the realization or implementation of these ideas (Scott & Bruce, 1994; West & Farr, 1990).

Past research has consistently provided empirical support for the positive impact of CSE on creative performance. However, most of these studies have ignored the dynamic nature of CSE and its association with creative behaviors (e.g., Beghetto et al., 2011; Gong et al., 2009; Tierney & Farmer, 2002). This is unfortunate as self-efficacy theory has claimed that beliefs regarding one’s own domain-specific abilities is not an innate, stable attribute of individuals but can in fact be fostered through both individual and environmental influences (Gist & Mitchell, 1992). For example, previous work has indicated that self-efficacy beliefs can be derived from the accumulation of successful experiences, vicarious learning or verbal persuasion (Bandura, 1997). One notable exception that has addressed the malleability of CSE in a two-wave study (Tierney & Farmer, 2011), showed that increases in CSE were associated with increases of one’s creative performance over time. This suggests that CSE does not only differ between people but at any given point in time, individuals may experience different levels of self-efficacy which can affect their creative outcomes.

Previous work on individual creativity delineates that creative successes can be achieved through two different cognitive processing styles (Baas, De
Dreu, & Nijstad, 2011; De Dreu, Baas, & Nijstad, 2008; Roskes, De Dreu, & Nijstad, 2012). On the one hand, a flexible cognitive style may help individuals to generate creative ideas through divergent thinking, flat associative hierarchies where multiple and broad categories are explored. On the other hand, a persistent cognitive style is associated with systematic thinking, perseverance, and high effort where ideas are generated through a more in-depth exploitation of a small amount of cognitive categories. In a similar regard, CSE has been argued to set the stage for creative performance in the following ways. First, self-efficacious individuals are more inclined to engage in broader information searches, for example by screening their direct environment for relevant informational input, and consequently have more easily access to new knowledge that is vital for the production of novel and valuable ideas (Bandura, 1986; Richter et al., 2012). Furthermore, a stronger sense of domain-specific self-efficacy enhances analytical thinking and memory processes (Cervone, Jiwani, & Wood, 1991), and this increased cognitive flexibility should help individuals to integrate available knowledge to develop creative ideas. Second, individuals with strong levels of CSE are more likely to exert sustained effort and persistence when conducting creativity tasks (Tierney & Farmer, 2002). Indeed, creative activities yield a higher probability of failure in comparison with more routine tasks which might discourage individuals who do not believe they have the necessary abilities to successfully complete such creative endeavors. Hence, taken together, the above mentioned research findings suggest that CSE may affect one’s creative performance through cognitive flexibility as well as persistence and systematic efforts.

Given the different pathways through which CSE may affect creativity, we aim to provide a more fine-grained framework for examining this relationship by distinguishing two types of creativity that result from explorative or rather exploitative processes; radical and incremental creativity respectively.

**RADICAL AND INCREMENTAL CREATIVITY**

Most research that has focused on the relationship between CSE and creativity, has considered the originality criterion of creative performance as one single dimension (e.g., Gong et al., 2009; Tierney & Farmer, 2002, 2011).
However, creative ideas can range from modest adaptations of existing products or procedures (i.e., somewhat original) to radical breakthroughs (i.e., very original), and still be equally relevant for an organization. This suggests that operationalizing creativity as a unitary construct (i.e., thereby neglecting the degree of novelty of creative performance) may be too simplistic. Previous work on organizational innovation has suggested that exploration (i.e., focus on fundamental change) and exploitation activities (i.e., focus on incremental change) are both vital for organizational effectiveness and success (e.g., Bledow, Frese, Anderson, Miriam, & Farr, 2009; Dewar & Dutton, 1986). Building on these insights from innovation research, Madjar, Chen and Greenberg (2011) have proposed a conceptual differentiation between two types of creativity to tap more adequately the novel or radical character of ideas, namely radical versus incremental creativity. Radical creativity refers to ideas that yield breakthroughs and thus substantially differ from existing products or practices. By contrast, incremental creativity encompasses modest modifications to existing products or practices.

The distinction between radical and incremental creativity is important as recent research indicates that both creativity types are associated with different motivational antecedents. For example, radical creativity has been found to be driven by more intrinsic forms of motivation (i.e., the activity at hand is experienced as pleasant and interesting) which is associated with cognitive flexibility, experimenting and risk-taking behavior. On the other hand, incremental creativity depends more strongly on externalized sources of motivation (e.g., explicit task requirements or rewards) which provide an incentive to invest effort in one’s work and increases the focus on task completion rather than divergent thinking or exploration (Gilson et al., 2012; Gilson & Madjar, 2011).

As CSE has been proposed to facilitate creativity through processes of cognitive flexibility (i.e., exploration) as well as sustained effort and perseverance (i.e., exploitation) (Richter et al., 2012; Tierney & Farmer, 2002), it seems reasonable to assume that week-level CSE should affect the production of radical as well as incremental creative ideas. Hence, we hypothesize that
within-person fluctuations in the experience of CSE will be positively associated with subsequent radical and incremental creativity.

*Hypothesis 1a:* Week-level CSE, while controlling for between-person average differences, will be positively related with one’s radical creative performance in the subsequent week.

*Hypothesis 1b:* Week-level CSE, while controlling for between-person average differences, will be positively related with one’s incremental creative performance in the subsequent week.

Although we hypothesize that week-level experiences of CSE are related to both types of creativity, the conditions that will affect both relationships should differ depending on whether they promote or inhibit either more explorative or exploitative processes. In the following, we argue that the relationship between CSE and radical creativity will depend on the extent to which individuals experience psychological ownership of ideas, while the relationship between CSE and incremental creativity is assumed to be influenced by expectancies regarding the outcomes of one’s creative efforts.

**The Moderating Role of Psychological Idea Ownership**

Psychological ownership can be defined as an attitudinal state which entails a sense of possession that people develop towards tangible (e.g., office space or products) or intangible targets (e.g., ideas or values) (Avey, Avolio, Crossley, & Luthans, 2009; Pierce, Jussila, & Cummings, 2009). Psychological ownership may arise without any legal claim of possession, but rather originates from the perception of personal control that people have over particular objects. This perceived control eventually may lead to a strong psychological attachment with the particular target of possession, even to the degree that it gets perceived as part of the extended self (Liu, Wang, Hui, & Lee, 2011; Pierce, O’Driscoll, & Coghlan, 2004).
Psychological ownership is positively associated with several desirable work-related attitudes (e.g., organizational commitment and job satisfaction) and work behaviors (e.g., work performance and organizational citizenship behavior) (Mayhew, Ashkanasy, Bramble, & Gardner, 2007; Pierce, Kostova, & Dirks, 2003). In a similar vein, people also may develop psychological ownership towards immaterial targets such as ideas (i.e., “this is my idea”). In this regard, past work suggests that people will evaluate ideas or beliefs more favorably, if they feel a strong sense of ownership for them (De Dreu & Van Knippenberg, 2005; Van Dyne & Pierce, 2004). In fact, idea ownership is often encouraged within organizations as it is assumed that employees who believe an idea is theirs, will be more willing to invest energy and time to further elaborate this idea and ultimately bring it to life (i.e., idea champions; Howell & Higgins, 1990).

However, despite the positive outcomes that are associated with psychological ownership, strong feelings of possession towards targets may also come with a cost. Specifically, Brown, Lawrence, and Robinson (2005) argue that psychological ownership may trigger territorial behaviors as individuals tend to protect and control their property, especially when they anticipate infringement on the target of ownership. Subsequently, in an attempt to restore or maintain ownership of an object, individuals will interact less with others, will restrict knowledge sharing, or will react defensively towards others who try to use or adapt the target of possession. Consequently, it can be expected that strong feelings of idea ownership might interfere with the creative process, as idea generation activities strongly depend on informational resources (e.g., unique knowledge or feedback) that can be obtained through interaction with team members, supervisors or the broader social network (e.g., Richter et al., 2012; Zhou, Shin, Brass, Choi, & Zhang, 2009; Zhou, 2003). This reasoning is consistent with the study of Baer and Brown (2012), as they demonstrated that strong feelings of idea ownership propels people to selectively adopt other’s suggestions for change. More specifically, they found that people with a strong sense of idea ownership are more likely to resist suggestions that imply subtractive changes to their ideas (i.e., refinements comprising the elimination of certain idea characteristics instead of adding extra elements). Hence, by not
considering the full range of potentially useful informational input (i.e., suggestions for subtractive change) that is available within their environment, people with strong feelings of idea ownership might miss out on opportunities to substantially improve the quality of their creative output.

In the present study, we argue that week-level CSE will be more likely associated to the production of creative output in case of low levels of psychological ownership over ideas. More specifically, it is our contention that people who experience strong levels of CSE will be more inclined to access and mobilize informational resources (e.g., broad information searches, information processing) when they do not feel the need to behave protective toward their own ideas (i.e., caused by high levels of idea ownership). However, as we have argued that week-level CSE mainly leads to radical creativity through the exploration of new knowledge and cognitive flexibility, we expect that strong idea ownership is more likely to affect the CSE-radical creativity relationship (i.e., in comparison with the CSE-incremental creativity relationship which relies more on perseverance and exploitation activities). Thus, the following hypothesis can be formulated:

**Hypothesis 2:** Psychological idea ownership moderates the relationship between week-level CSE and one’s radical creative performance in the subsequent week, such that week-level CSE will have a stronger positive relationship with radical creativity when psychological ownership is low than when psychological ownership is high.

**THE MODERATING ROLE OF OUTCOME EXPECTANCY**

So far, we have argued that week-levels of CSE are more likely to be conducive for the subsequent creative performance of individuals (i.e., in terms of radical creativity), when psychological idea ownership is low so that protective behaviors are limited and informational resources can be optimally used. However, in addition to cognitive flexibility and broad information seeking, CSE is also said to facilitate individual creativity through increased levels of persistence and effort (Shin, Kim, Lee, & Bian, 2012; Tierney &
Farmer, 2002). Given the challenging nature of creative endeavors and the high probability of failure when engaging in such activities, it is often crucial to invest sufficient effort and show perseverance to obtain creative output (Amabile, 1996; Bandura, 1977; Hirst, Van Knippenberg, Chen, & Sacramento, 2011; Oldham & Cummings, 1996).

However, previous research suggests that even if people are convinced that they have the required abilities to perform a particular task (i.e., high levels of self-efficacy), they will be less likely to persist if they do not expect that their efforts will be associated with desired outcomes (Riggs & Knight, 1994). The idea that individuals act upon the expected consequences associated with their efforts is commonly referred to as outcome expectancy (Bandura, 1977), and is in line with the tenets of behavioral theories such as learned industriousness theory (Eisenberger, 1992) and the expectancy theory of motivation (Vroom, 1964).

Although most creativity research, has emphasized the importance of intrinsic task interest in explaining individual creativity and innovation (e.g., Amabile, Hill, Hennessey, & Tighe, 1994; Grant & Berry, 2011), there is recent work which highlights the role of outcome expectations as a powerful motivational force to incite innovative efforts at the workplace. For example, Yuan and Woodman (2010) demonstrated that innovative behavior is influenced not only by intrinsic motivational considerations, but also depends on performance and image outcome expectations (e.g., anticipating performance improvement and image gains). This is consistent with findings of Frese, Teng, and Wijnen (1999), indicating that employees had more ideas and also were more likely to submit ideas to their company’s suggestion system if they were interested in improving their own job and work conditions. Furthermore, Moenkemeyer, Hoegl, and Weiss (2012) found that outcome expectations make individuals more resilient in adverse situations (i.e., setbacks) throughout the innovation process.

We argue that the positive effect of CSE on one’s creative performance will be strengthened if individuals expect their creative efforts will lead to desirable outcomes. Specifically, it is our contention that high levels of outcome expectancy will help individuals with strong levels of CSE to focus on task-
completion and to demonstrate enhanced effort concerning the generation of creative output. However, we expect that this interaction between week-levels of CSE and outcome expectancy will be important mainly for one’s subsequent incremental creative performance and not for radical creativity. This is because enhanced perseverance and hard work is likely to lead to the generation of more creative ideas, but within a limited range of cognitive categories (De Dreu et al., 2008). In other words, increased persistence and perseverance should manifest itself not in very diverse ideas, but rather in creative output that systematically builds on previous insights; hence incremental creativity. Furthermore, extrinsic forms of reinforcement have previously been demonstrated to mainly facilitate incremental creativity (Gilson et al., 2012). Therefore, we propose the following hypothesis:

**Hypothesis 3:** Outcome expectations moderate the relationship between week-level CSE and one’s incremental creative performance in the subsequent week, such that week-level CSE will have a more positive relationship with incremental creativity when outcome expectations are high than when outcome expectations are low.

**METHOD**

**SAMPLE AND PROCEDURE**

A longitudinal survey study was conducted among thirty-seven final year students in industrial product design at a Belgian university. Due to two dropouts, the sample size for the main analyses was reduced to thirty-five valid cases. Although from a traditional between-person approach, the sample size of our study seems relatively low, a within-subject design relies more on the total amount of observations (i.e., repeated measurements) rather than the number of subjects (Bledow & Frese, 2009; Bledow, Schmitt, Frese, & Kühnel, 2011; Ployhart & Ward, 2011; To, Fisher, Ashkanasy, & Rowe, 2012). The total sample included 29 (82.9%) men and six (17.1%) women. Their mean age was 21.57 years ($SD = 1.34$). At the time of data collection, participants were assigned to work on an industrial case as part of a course they followed on
industrial design and prototyping. Industrial cases were provided by collaborating organizations and required the development of a prototype that yielded a creative solution for a particular problem or need that these organizations had. The entire project period was divided into two blocks of seven weeks each, with eight class-free weeks in between (due to exam and holiday period). At the end of the project, students had to present their prototype to the respective organization involved and their individual performance was evaluated by their instructors. Given the long-term, complex, and realistic nature of this assignment in which creativity is critical for success, we were able to track creative functioning within-persons across time.

During the first week of their assignment, participants were informed about the general objective of the study and were asked to complete an initial paper survey providing demographic information. From the second week on, weekly reports were obtained by using web-based surveys. More specifically, participants were sent e-mailed links to an online questionnaire at the end of each week. Reminder e-mails were sent to participants who did not complete their survey within the first 48 hours. Participation was rewarded with occasional cinema tickets throughout the period of data-collection. In total, 411 reports were collected from the 35 participants over a period of 13 weeks. The overall response rate to survey requests was 90.3%. The mean number of responses per participant was 11.74 ($SD = 1.62$).

**Measures**

Participants were asked to complete thirteen weekly online surveys in total. All items included in the weekly surveys were adapted so that they exclusively referred to those activities that participants carried out in that particular week concerning their industrial case.

**Creative self-efficacy.** This construct was assessed by a three-item scale by Tierney and Farmer (2002) (e.g., ‘This week, I felt that I was good at generating novel ideas’). Across all occasions, coefficients alpha of this scale’s ratings was .81. The answers were scored on a seven-point anchored Likert scale ranging from $1 = \text{totally disagree}$ to $7 = \text{totally agree}$.
**Psychological idea ownership.** This construct was assessed with five items adapted from the psychological ownership scale of Van Dyne and Pierce (2004) measuring the degree of ownership experienced concerning the ideas they worked on during the week (e.g., ‘These are my ideas’). Across all occasions, coefficients alpha of this scale’s ratings was .91. The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree.

**Outcome expectancy.** This construct was assessed with six items adapted from the instrumentality scale of Baer (2012) measuring the extent to which participants expected that their creative efforts of that week would lead to desirable outcomes such as praise by their instructors or better marks (e.g., ‘This week, I worked on ideas for the prototype assignment because of a possible reward or marks’). Across all occasions, coefficients alpha of this scale’s ratings was .81. The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree.

**Incremental and radical creativity.** These two types of creativity were assessed with three items each adapted from Madjar, Greenberg and Chen (2011) and measured the extent to which participants described the ideas they worked on during the week as incremental (e.g., ‘incremental improvements upon existing products and processes’) and radical (e.g., ‘radically new ways of doing things’). Across all occasions, coefficients alpha for the incremental creativity scale’s ratings was .75 and for the radical creativity scale’s ratings was .83. The answers were scored on a seven-point anchored Likert scale ranging from 1 = totally disagree to 7 = totally agree. To check whether both types of creativity are two independent constructs, we performed a confirmatory factor analysis based on scores that were centered at the person mean (Bolger, Davis, & Rafaeli, 2003; Sonnentag & Jelden, 2009). More specifically, a two-factor model with incremental creativity and radical creativity provided a satisfactory fit ($\chi^2$ (8) = 16.172, $p < .05$, IFI = .99, CFI = .99, RMSEA = .054) and fitted the data better than a one-factor model with all items loading on one single factor (Delta $\chi^2$(1) = 280.952, $p < .001$).
ANALYTICAL APPROACH

Given that our dataset consists of repeated week-level measurements (N = 411) nested within 35 individuals, we used hierarchical linear modeling (HLM 6) to test all hypotheses. To investigate the hypothesized lagged relationships between week-level CSE and radical and incremental creativity, we temporally separated the dependent variables by one survey period (t+1). As scores were not lagged across nonconsecutive observations (these instances were treated as missing data), the total sample size for the main analyses was reduced from 411 to 347 observations. To control for serial dependence in the dependent variable measure (i.e., radical and incremental creativity), we specified an autoregressive baseline model including the dependent variable measured at the previous survey period. Hence, week-level changes in the dependent variables could be accounted for. Additionally, general level of CSE was included as a control variable at the between-person level so we could investigate whether lagged week-level creativity (i.e., incremental and radical creativity) could be explained by week-level CSE above and beyond between-person average differences in CSE. General CSE was calculated by averaging week-level CSE scores across all measurement waves. To test our hypotheses, within-person variables were centered around the person mean (group-mean centering) and general CSE was centered around the grand-mean.

RESULTS

Descriptive statistics and correlations among all study variables are shown in Table 1. Before testing our hypotheses, we estimated the amount of variance in the week-level dependent variables that can be attributed to the within- and between-person level. For radical creativity, 68% of the total variance could be explained within individuals. With regard to incremental creativity, we found that 75% of the total variance was within persons. Taken together, these substantial within-person variances suggest that analyses at the week-level, using multilevel methodology, are appropriate.
HYPOTHESIS TESTING

To test the hypothesized cross-lagged relationships between week-level CSE and both types of creativity, we specified a series of nested multilevel models. In model 1 we entered control variables; namely general CSE (between-person level) and previous week’s level of the dependent variable (within-person level); in Model 2 we included the main effects (Hypothesis 1a and 1b); and in Model 3 we entered the two-way interaction term (Hypothesis 2 & 3). Furthermore, as an exploratory test, we also investigated the alternative interaction effect for each dependent variable (Model 4 & 5).

Table 2 represents multilevel analyses with lagged radical creativity as a dependent variable. In support of Hypothesis 1a, we can see in Model 2 that, after controlling for general CSE and radical creativity of the previous week, week-level CSE was significantly associated with lagged radical creativity ($\gamma = 0.13, SE = .06, p < .05$). Furthermore, psychological idea ownership did not directly impact radical creativity ($\gamma = -0.04, SE = 0.05, ns$). In model 3, we tested whether week-level psychological idea ownership moderated the relationship between week-level CSE and lagged radical creativity. In support of the moderation hypothesis (Hypothesis 2), the interaction between week-
Table 2

*HLM estimates of the hypothesized interactive effects on Radical Creativity (time t+1)*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.44 (0.06)**</td>
<td>4.44 (0.06)**</td>
<td>4.46 (0.06)**</td>
<td>4.45 (0.06)**</td>
<td>4.44 (0.06)**</td>
</tr>
<tr>
<td>General creative self-efficacy</td>
<td>0.84 (0.08)**</td>
<td>0.85 (0.09)**</td>
<td>0.84 (0.09)**</td>
<td>0.84 (0.09)**</td>
<td>0.84 (0.09)**</td>
</tr>
<tr>
<td>Previous level radical creativity</td>
<td>-0.04 (0.07)</td>
<td>-0.10 (0.08)</td>
<td>-0.07 (0.08)</td>
<td>-0.11 (0.08)</td>
<td>-0.11 (0.08)</td>
</tr>
<tr>
<td>Week-level creative self-efficacy</td>
<td>0.13 (0.06)*</td>
<td>0.12 (0.06)</td>
<td>0.14 (0.06)*</td>
<td>0.14 (0.07)*</td>
<td></td>
</tr>
<tr>
<td>Week-level idea ownership</td>
<td>-0.04 (0.05)</td>
<td>-0.04 (0.06)</td>
<td>-0.02 (0.08)</td>
<td></td>
<td>-0.02 (0.08)</td>
</tr>
<tr>
<td>Week-level outcome expectancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.02 (0.08)</td>
</tr>
<tr>
<td>Week-level creative self-efficacy x</td>
<td></td>
<td></td>
<td></td>
<td>-0.17 (0.06)*</td>
<td></td>
</tr>
<tr>
<td>Week-level idea ownership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week-level creative self-efficacy x</td>
<td>-0.17 (0.06)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week-level outcome expectancy</td>
<td>0.05 (0.07)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$\Delta R^2$ within-group$^b$          .04   .03   .04   .02   .00

$\Delta R^2$ between-groups$^b$        .85   .00   .00   .00   .00

*Note. N = 347 observations nested within 35 individuals. General creative self-efficacy is a Level 2 variable; all other predictors are Level 1 variables. Values are unstandardized regression coefficients (y). Standard errors are indicated in parentheses. $^a$ We did not hypothesize a significant moderation effect of outcome expectancy on the relationship between creative self-efficacy and radical creativity. However, this alternative moderator and interaction term was included for the purposes of an exploratory examination. $^b$ Variance explained over and above the variance explained by the previous model. Model 1 was compared with the null model. The within-individual residual variances did decrease on introducing additional within-individual predictors. However, the between-individual residual variance slightly increased (see Snijders & Bosker, 1999, for a treatment of negative $R^2$ values in multilevel modeling). $p < .05$; **$p < .01$*
level CSE and psychological idea ownership was significant (γ = -0.17, SE = 0.06, \( p < .05 \)). Figure 1 illustrates this moderation effect. As hypothesized, the relationship between week-level CSE and lagged radical creativity was positive if psychological idea ownership was low. To facilitate the interpretation of this interaction pattern, a simple slope test was performed (Preacher, Curran, & Bauer, 2006) and indicated that on weeks with high levels of psychological idea ownership (one SD above the mean), week-level CSE was not associated with cross-lagged radical creativity (γ = -0.03, SE = .09; \( z = -0.36; ns \)), but on weeks with low levels of psychological idea ownership (one SD below the mean), CSE was positively associated with lagged radical creativity (γ = 0.27, SE = .08; \( z = 3.38; p < .001 \)). Furthermore, the exploratory interaction test with outcome expectancy as an alternative moderator (Model 5) indicates that the interaction between week-level CSE and outcome expectancy was not significant for what concerns lagged radical creativity (γ = 0.05, SE = .07, ns).

![Figure 1](image-url)

**Figure 1. Interaction effect of week-level creative self-efficacy (CSE) and psychological idea ownership on radical creativity (Hypothesis 2)**

Table 3 includes the multilevel estimates with lagged incremental creativity as a dependent variable.
Table 3

**HLM estimates of the hypothesized interactive effects on Incremental Creativity (time t+1)**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>4.37 (0.09)**</td>
<td>4.37 (0.09)**</td>
<td>4.34 (0.10)**</td>
<td>4.37 (0.09)**</td>
<td>4.38 (0.10)**</td>
</tr>
<tr>
<td>General creative self-efficacy</td>
<td>0.24 (0.15)</td>
<td>0.24 (0.15)</td>
<td>0.30 (0.15)</td>
<td>0.23 (0.16)</td>
<td>0.19 (0.15)</td>
</tr>
<tr>
<td>Previous level incremental creativity</td>
<td>0.00 (0.06)</td>
<td>-0.06 (0.06)</td>
<td>-0.04 (0.06)</td>
<td>-0.04 (0.06)</td>
<td>-0.02 (0.06)</td>
</tr>
<tr>
<td>Week-level creative self-efficacy</td>
<td>0.09 (0.07)</td>
<td>0.06 (0.07)</td>
<td>0.11 (0.06)</td>
<td>0.10 (0.06)</td>
<td></td>
</tr>
<tr>
<td>Week-level outcome expectancy</td>
<td>0.08 (0.11)</td>
<td>0.11 (0.11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week-level idea ownership&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td>-0.08 (0.05)</td>
<td>-0.08 (0.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week-level creative self-efficacy x</td>
<td></td>
<td></td>
<td></td>
<td>0.17 (0.08)&lt;sup&gt;*&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Week-level outcome expectancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week-level creative self-efficacy x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.11 (0.08)</td>
</tr>
</tbody>
</table>

**ΔR² within-group<sup>b</sup>** | .00 | .08 | .05 | .04 | .04 |

**ΔR² between-groups<sup>b</sup>** | .05 | .00 | .00 | .04 | .00 |

*Note.* N = 347 observations nested within 35 individuals. General creative self-efficacy is a Level 2 variable; all other predictors are Level 1 variables. Values are unstandardized regression coefficients (y). Standard errors are indicated in parentheses. <sup>a</sup> We did not hypothesize a significant moderation effect of idea ownership on the relationship between creative self-efficacy and incremental creativity. However, this alternative moderator and interaction term was included for the purposes of an exploratory examination. <sup>b</sup> Variance explained over and above the variance explained by the previous model. Model 1 was compared with the null model. The within-individual residual variances did decrease on introducing additional within-individual predictors. However, the between-individual residual variance slightly increased (see Snijders & Bosker, 1999, for a treatment of negative $R²$ values in multilevel modeling). <sup>*</sup>p < .05; <sup>**</sup>p < .01
In contrast with what we expected (Hypothesis 1b), Model 2 shows that week-level CSE did not directly affect lagged incremental creativity ($\gamma = 0.09, SE = .07, ns$). However, when the interaction term between week-level CSE and outcome expectancy was added to the equation (Model 3), we found a significant interaction effect after controlling for the main effects of week-level CSE and outcome expectancy ($\gamma = 0.17, SE = .07, p < .05$). Figure 2 represents this interaction effect. In support of Hypothesis 3, simple slope tests indicate that on weeks with low levels of outcome expectancy (one $SD$ below the mean), CSE was not related to lagged incremental creativity ($\gamma = -0.04, SE = 0.09; z = -0.41; ns$), but on weeks with high levels of outcome expectancy (one $SD$ above the mean), CSE was positively related with cross-lagged incremental creativity ($\gamma = 0.16, SE = 0.08; z = 2.10; p < .05$). Furthermore, the exploratory interaction test with psychological idea ownership as an alternative moderator (Model 5) indicates that the interaction between week-level CSE and psychological idea ownership was not significant for what concerns lagged incremental creativity ($\gamma = -0.11, SE = .08, ns$).

Figure 2. Interaction effect of week-level creative self-efficacy (CSE) and outcome expectancy on incremental creativity (Hypothesis 3)
DISCUSSION

This research builds on the notion that individual creativity is not a stable behavioral tendency but can in fact substantially vary within people depending on the critical influence of ‘creative self efficacy’ as a proximal motivational state. Yet the typical between-person studies in the current literature have obscured the circumstances under which fluctuating levels of CSE are more likely to affect creativity. In the present study, we examined whether and when weekly fluctuations in the CSE beliefs of individuals correspond with changes in their radical or incremental creative performance in the subsequent week. In this regard, we found that week-level CSE was positively associated with radical creativity, and explained additional variance beyond between-person differences in CSE. Furthermore, our results reveal that week-level CSE was positively associated with subsequent radical creativity, when individuals experienced low levels of psychological idea ownership, but not in case of high levels of psychological idea ownership. This finding suggests that individuals will only benefit from strong momentary levels of CSE in terms of their radical creative performance if they do not feel the need to protect their own ideas and hence shy away from potential valuable external input. For what concerns incremental creativity, we found a different pattern of results. Although we did not observe a direct relationship between week-level CSE and subsequent incremental creativity, results indicate that high levels of outcome expectancy strengthened this relationship. Only when individuals expected that their creative efforts would lead to desirable outcomes, strong levels of momentary CSE were more likely to be associated with increased incremental creativity.

THEORETICAL CONTRIBUTION

Our study advances prior literature on CSE and creativity in the following ways: First, by providing evidence for the impact of weekly fluctuations of CSE on one’s subsequent creative performance, we add to previous between-person studies which have demonstrated that people’s characteristic (i.e., general) levels of CSE are positively associated with their overall creative performance (e.g., Carmeli & Schaubroeck, 2007; Gong et al.,
2009; Richter et al., 2012; Tierney & Farmer, 2004). Hence, our cross-lagged longitudinal design does not only yield a methodological advancement but also allows us to make inferences about the relationship between CSE and creativity at the within-person level. This way we could explore whether increased levels of CSE (i.e., when individuals experience higher levels of CSE than they normally do) would benefit one’s creative performance.

Second, by adopting a creativity framework, which distinguishes between radical and incremental ideas, we expand our understanding of how CSE is related to exploratory and exploitative activities during the course of a creativity project. We build on prior creativity research, which has highlighted the importance of cognitive flexibility as well as persistence as two separate routes that may lead to creativity (De Dreu et al., 2008; Roskes et al., 2012), and argue that both processes are important to explain how CSE is uniquely associated with both types of creativity.

Third, by investigating two boundary conditions (i.e., psychological idea ownership and outcome expectancy) that facilitate or interfere with exploratory and exploitative processes respectively, we provide insight in when people are more likely to benefit from strong levels of CSE and whether this will be conducive for their radical or incremental creative performance. The identification of moderator variables is important as our results suggest that increased levels of CSE may not be enough by itself. More specifically, we found that the positive association between week-level CSE and radical creativity became non-significant when people experienced high levels of idea ownership. Similarly, CSE only was positively associated with incremental creativity when people had strong outcome expectancies. Furthermore, as we approached these two moderator variables at the within-person level, we were able to detect interaction effects that could be missed at the between-person level. Indeed, psychological ownership and outcome expectancy should not be regarded as stable personal attributes as they are likely to be linked with particular ideas that people work on during specific weeks.
LIMITATIONS AND FUTURE RESEARCH

A limitation of our study is that we relied on self-ratings, including our creative performance measures. To reduce problems associated with common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), we collected our data at different points in time and temporally separated our predictor and outcome variables. Although self-report measures have been found to be subject to self-presentation bias (i.e., due to social desirability tendencies; Tourangeau, Rips, & Rasinski, 2000), we believe that this did not severely affect our observed results because of the following. Given the specific context of our study, final-year students in industrial product design who were assigned to develop a prototype for an industrial case, it seems reasonable to assume that radical, groundbreaking ideas were more likely to be pursued in this particular setting. Hence, if social desirability would have affected their self-evaluations, we should be able to observe a tendency to systematically evaluate their own ideas as very radical. However, this was not the case as we found strong within-person variability in their self-ratings of radical (68%) as well as incremental creativity (75%). An explanation for this observation is that participants often received feedback on their ideas from their instructors and collaborating industrial partners, which should have provided them a realistic, less biased perspective on their creative performance during the course of the project. Moreover, due to their acquired technical expertise, and previous experience on prototyping assignments, they should have been able to make a correct distinction between ideas that are radical or incremental. To provide further, more objective evidence for the construct validity of our dependent variables, we also analyzed the general task performance score for each student that was given by their instructor at the end of the project (which was the final mark on their prototype assignment). Although this score entails more than creativity alone, the originality of each performance was specifically taken into account when evaluating the students, and thus this score can be informative for the degree of radical creativity in the assignment. To test the extent to which this performance score was associated with self-rated radical and incremental creativity (at the between-person level), we calculated Pearson correlation coefficients. As we found that the performance score provided by the instructor
was significantly associated with self-rated creativity ($\rho = .38, p < 0.05$) but not with incremental creativity ($\rho = .24, n.s.$), this provides some support on the validity of the self-self-ratings of radical creativity in our study. However, it is clear that future studies should extend this investigation by also including repeated creativity measurements from other sources, such as instructor or supervisor reports.

Another promising avenue for future research for extending the analysis of the dynamic relationship between CSE and individual creativity is the investigation of the underlying mechanisms on which we relied to develop the hypotheses of our study. For example, it could be explicitly tested whether exploration (e.g., by measuring broad information seeking efforts) and exploitation (e.g., by measuring systematic and persistent idea generation efforts) processes underlie the unique relationship between CSE and the production of radical and incremental ideas. Over and above the implications provided by our study for understanding when momentary CSE relates to different types of creativity, future research could identify other moderators. For instance, whether team trust facilitates the tendency of individuals with strong levels of CSE to reach out to others for new knowledge, or whether specific creativity goals would help them to persist in their systematic creative efforts.

**Practical Implications**

One of the main reasons for the increasing popularity of CSE as a key antecedent of workplace creativity is because an individual’s sense of his or her capacity for creative work is malleable and can be relatively easy shaped. We believe this is also one of the main contributions of our study relative to previous conceptualizations of creative self-efficacy as a relatively stable between-persons construct: our study shows that creative self-efficacy indeed fluctuates within persons and these within-person variations have important implications. Thus, our findings should provide more compelling evidence that educators and organizations can develop and stimulate creative self-efficacy in persons. For example, through verbal persuasion (Tierney & Farmer, 2002), or role modeling when behaviors that are conducive for creativity of others are observed and consequently persuade individuals that they are able themselves to
engage in creative endeavors (Choi, 2012). Hence, this suggests that practitioners and educators can apply various cost-efficient strategies to stimulate momentary states of CSE among their employees or students.

Our results also indicate that strong levels of CSE are associated with two types of creativity; radical and incremental ideas. This implies that organizations aiming to stimulate creativity through ‘CSE development’ interventions should not exclusively target R&D divisions where the production of radical ideas is more desirable, but could also consider operational divisions, which can benefit from (incremental) employee creativity as well. However, depending on which type of creativity one aims to pursue, there are specific boundary conditions that should be taken into account. In this regard, we found that psychological idea ownership makes it hard for individuals with strong levels of CSE to engage in information seeking activities and advice taking due to protective attitudes they have towards their ideas. Therefore, it seems crucial to buffer the negative impact of psychological idea ownership, especially when the pursuit of radical ideas is required, for example by facilitating knowledge sharing and promoting collaborative behaviors between team-members (e.g., Baer & Brown, 2012; Goncalo & Staw, 2006).

For what concerns divisions or education programs that wish to promote more incremental forms of creativity (when idea development is not their core activity), we found that state CSE is more likely to affect one’s persistence to achieve creative success, if people expect that their creative efforts will be associated with several desirable outcomes. Outcome expectations could be instigated by systematically acknowledging one’s creative efforts, for example by providing rewards that are useful and informative to one’s job or education (e.g., extra resources for carrying out subsequent projects or providing interesting internship offers).

**Conclusion**

Despite the theoretical claims that have been made concerning the relative malleable nature of self-efficacy beliefs, there is limited research on within-individual variability in the impact of CSE on individual creativity. Our week-level study has demonstrated that the relationship between CSE and
creativity is characterized by substantial within-person variability. Furthermore, we found that it is important to differentiate between the production of radical and incremental ideas, as the relationship between week-level CSE and both types of creativity is established under different conditions; psychological idea ownership and outcome expectancy. Our findings have implications for practitioners and educators that aim to facilitate radical or incremental creativity through CSE development initiatives, as different boundary conditions should be taken into consideration to promote explorative or rather exploitative idea generation efforts.
REFERENCES


ambidexterity. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, 2, 305–337.


CHAPTER 5

WHAT MAKES CREATIVE TEAMS TICK?
RESOURCES, ENGAGEMENT AND PERFORMANCE ACROSS CREATIVITY TASKS.

ABSTRACT

The present study proposes a research model to examine the motivational potential of team social resources at a task level for teams conducting creative activities. Extending the job demands-resources model framework to the team level, a reciprocal process was expected to unfold across a series of subsequent creativity task episodes: (1) during a creativity task episode, team social resources lead to collective task engagement which in turn has a positive effect on team creative performance (i.e., in terms of perceived team performance and independently rated creativity), and finally (2) perceived team creative performance predicts the development of future team social resources. The current study relied on a three-wave longitudinal organizational simulation exercise, in which 118 project teams (i.e., 605 individuals) conducted three creativity tasks. The results generally supported our hypotheses: (1) Positive associations were found between team social resources and collective task engagement, and between collective task engagement and team creative performance; (2) cross-lagged effects were observed of perceived team creative performance on team social resources as measured at each subsequent task episode.

INTRODUCTION

Organizations striving to keep their position in a global and competitive market are under constant pressure to make the right decisions, to expand their business and to come up with new and exciting products and services. Consequently, such organizations are highly in need of effective working strategies that may help them to cope with the extremely demanding environment in which they have to operate. In this respect, employee creativity has been advanced as a key element for organizational effectiveness (Amabile, 1988; Baer & Oldham, 2006). During the past decades, creativity research has grown exponentially and provided numerous insights on how individual employee creativity can be fostered (Amabile, Conti, Coon, Laznby, & Herron, 1996; George & Zhou, 2001; Zhou, Shin, Brass, Choi, & Zhang, 2009). Moreover, given the increasing reliance of organizations on project based teams - that is, temporary groups that are assigned to work on a specific task during short amounts of time- to rapidly produce creative outcomes (Gersick, 1988), research has also taken important steps towards a better understanding of psychosocial processes leading to team-level creativity (DeRue & Rosso, 2009; Eisenbeiss, Van Knippenberg, & Boerner, 2008; Paulus & Nijstad, 2003).

To date, a variety of motivation theories have substantially impacted employee creativity research, with the intrinsic motivation perspective being one of the most influential theoretical frameworks (Amabile, Hill, Hennessey, & Tighe, 1994; Amabile, 1985; Grant & Berry, 2011). However, despite the central role attributed to motivational strivings for individual creativity in past creativity research, it remains unclear whether intrinsic task motivation at a collective level influences the creative performance of project teams. In recent years, scholars have begun to identify potential team-level determinants (e.g., team creative efficacy, team-level information processing, intergroup competition; Baer, Leenders, Oldham, & Vadera, 2010; Nijstad & De Dreu, 2012; Shin & Zhou, 2007; Zhang, Tsui, & Wang, 2011), hinting to the possibility of motivational processes in teams affecting their creative performance. However a theoretical model explaining how a collective task motivational state relates to team creativity and its link to previously identified antecedents is currently lacking. Hence, team creativity research is in need of a
theoretical framework and empirical evidence that explains whether and how intrinsic task motivational processes, instigated by team-level antecedents, may benefit team creativity.

In the present study, we draw on the job demands-resources model to investigate those team motivational dynamics that underlie the creative performance of project based teams during specific task episodes (i.e., requiring the collaboration between team members in order to produce a single team product rather than the average of individual team member contributions). To do so, a three-wave model is developed and tested which proposes collective task engagement (i.e., vigor, dedication, and absorption) as a crucial motivational mechanism that transmits the effects of team social resources (i.e., team coordination and team cohesion) to team creativity during specific task-episodes. Furthermore, as teams are inherent dynamic entities that can adapt and change (McGrath, Arrow, & Berdahl, 2000), it can be expected that the development of team social resources depends on how a team performed during a previous task. Hence, we propose a reciprocal cycle of team social resources and team creative performance across subsequent task episodes.

Thus, this study contributes to the creativity literature in a number of ways: First, by advancing the specific motivational states that underlie creativity at the team level, we extend prior creativity research that mainly has focused on the impact of motivational dynamics on individual creativity. By developing the motivational underpinnings of team creativity at the group level and linking it to theoretical creativity perspectives advanced at the individual level, this study provides an important step towards integration of creativity research findings at different levels of analysis (Chan, 1998). Second, by introducing collective task engagement as an underlying mechanism through which team social resources may affect team creativity, the present study provides a comprehensive theoretical framework that will help to identify new antecedents of team creativity in future research. Finally, by adopting a longitudinal research model, we provide much needed insight on how team creativity develops over time (see for instance, call of Shin and Zhou, 2007). More specifically, we rely on a three-wave lab design with project teams participating in an organizational simulation exercise, to explore the reciprocal relationship between team social resources
and team creative performance across subsequent task episodes in time. In what follows, we first define creativity and then delineate in more detail the theoretical model underlying this study.

**THEORETICAL BACKGROUND AND HYPOTHESES**

In accordance with previous research, we conceive creativity as the production of ideas concerning products or services that are novel and useful (Amabile, 1996; Shalley, 1995). Creativity should be differentiated from innovation in the sense that creativity refers to the idea generation stage, while innovation also implies the realization and implementation of generated ideas (West & Farr, 1990).

Most creativity research so far has focused on antecedents of individual creativity (e.g., Baas, De Dreu, & Nijstad, 2008; Baer & Oldham, 2006; Eisenberger, Armeli, & Pretz, 1998; Madjar, Greenberg, & Chen, 2011; Sheldon, 1995), whereas team creativity is a relative unexplored field which only has gained importance in recent years. In a meta-analysis spanning 30 years of creativity and innovation research, Hülsheger, Anderson and Salgado (2009) analyzed research findings on team-level predictors of individual and team creativity and innovation at work. In their study, they distinguished two sets of team-level antecedents of creativity and innovation according to the widely accepted input-process-output model of Hackman (1987); namely ‘team input’ and ‘team process’ variables. Team input variables mainly comprise factors that are related to the composition and structure of a team such as team size, team longevity and background diversity. Team process variables on the other hand, refer to variables such as internal communication, team cohesion and vision, which should also be beneficial for creativity. This meta-analysis revealed that team process variables displayed stronger links with creativity than team input variables did. Moreover, team process variables appeared to be more strongly related to creativity that was measured at the team than at the individual level. The positive effects of these process variables were partially attributed to their impact on team member motivation to engage in creative activities, stressing the need for a better understanding of the motivational underpinnings of team creativity.
Motivational aspects are a key determinant in nearly all theories of creativity (e.g., Hirst, Van Knippenberg, & Zhou, 2009; Shalley, 1991; Tierney & Farmer, 2002; Zhou, 1998) and, accordingly, there is extensive empirical evidence for the beneficial effects of individual motivation for individual creativity (e.g., Amabile, 1985; Baer, Oldham, & Cummings, 2003; Byron, Khazanchi, & Nazarian, 2010; Collins & Amabile, 1999; Eisenberger, 2009). For example, in the past decades, the intrinsic motivation perspective has been one of the most influential theoretical frameworks guiding employee creativity research (Amabile et al., 1994; Amabile, 1985). Intrinsically motivated people are said to engage in activities for the sake of the task itself, which is perceived as pleasant and interesting (Deci & Ryan, 1987). It is argued that intrinsic motivation increases the tendency of individuals to be curious, cognitively flexible, risk taking, and persistent in the face of barriers, which should result in creative outcomes (Grant & Berry, 2011; Utman, 1997; Zhou, 1998).

In parallel, an emerging body of research suggests that motivational processes are also important for the creative performance of teams. For example, research on group functioning in social psychology has shown that teams are more likely to perform creatively, when team members are willing to search, process, and communicate information among each other, and when team members are concerned with the attainment of team goals rather than pursuing individual outcomes (i.e., the motivated information processing in groups model; Bechtoldt, De Dreu, Nijstad, & Choi, 2010; De Dreu, Nijstad, Bechtoldt, & Baas, 2011). As another example, Shin and Zhou (2007) illustrated the influence of collective creative efficacy beliefs on the creative performance of teams. Specifically, they argue that team creative efficacy is vital for team creativity as it boosts team members’ motivation to act and to invest time and effort in a particular task.

Although team-level processes are becoming a topic of increasing interest in creativity research, it remains unclear how collective motivational dynamics arise and evolve when team members are assigned to work together on a creativity task during short periods of time (i.e., specific task episodes) and how this may affect their creative performance. Nevertheless, as previous research indicates that people who closely collaborate together are likely to
display similar motivational and behavioral patterns (George, 1990, 1996), it might be illuminating to further examine how collective motivation is built on shared task experiences and interactions among team members and how this may contribute to a team’s creative success. Therefore, we propose collective task engagement as a motivational construct that underlies team creativity by adopting the job demands-resources model perspective.

**SOCIAL RESOURCES, COLLECTIVE TASK ENGAGEMENT AND TEAM CREATIVITY**

In the present study, we have opted for the Job Demands-Resources model as this theory has been successfully employed in predicting the motivational impact of job-related resources and creativity at the individual level (e.g., Bakker & Xanthopoulou, 2013; Daniels et al., 2013; de Jonge, Le Blanc, Peeters, & Noordam, 2008). By drawing parallels with motivational processes at the individual level, this model will serve as a building block to develop our hypotheses at the team level, suggesting that team resources may fulfill a similar role in explaining motivational processes in team creativity as individual resources at the individual level. The Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007; Crawford, LePine, & Rich, 2010; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004) posits that employees’ psychological states and consequently their work performance are determined by the extent to which individuals have work-related resources at their disposal. According to the JD-R model, such resources instigate positive emotions and foster an affective motivational state among employees, called work or task engagement. Therefore, *work-related resources* should be perceived as those job- (e.g., autonomy and coaching), personal- (e.g., self-efficacy and optimism), or social properties (e.g., supervisory support, favorable social climate) that are instrumental in reducing challenging work demands, in facilitating specific work-related goals and in nurturing intrinsic interest and personal growth (Bakker & Demerouti, 2007; Demerouti et al., 2001; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009).

At the team level, social resources (i.e., social capital) are considered to be important as it allows teams to increase their productivity (Van Emmerik &
Brenninkmeijer, 2009). More specifically, team social resources refer to several aspects of team functioning that emerge from interpersonal dynamics between team members and from which teams can benefit in terms of overall performance and behavioral action (Oh, Chung, & Labianca, 2004). The present study focuses on two key team social resources that have been shown to be closely associated with the creative performance of teams; namely team coordination and team cohesion (Amabile et al., 1996; Hülsheger et al., 2009).

We chose these two social resources as coordinated and cohesive teams are likely to have a stable and solid foundation of interpersonal relationships that allows them to interact in a flexible and efficient manner (Smith et al., 1994). In other words, they build mutual motivational links which should benefit the team as a whole when conducting particular activities. Team coordination can be described as the extent to which team members depend on each other for information or other reciprocal inputs, and how well their activities are aligned in terms of sequence and timing (Le Pine, Piccolo, Jackson, Mathieu, & Saul, 2008). Team cohesion refers to the extent to which team members are committed to their team, and how well the group is integrated as it pursues its goals (Kozlowsky & Ilgen, 2006; Paskevich, Brawley, Dorsch, & Widmeyer, 1999). Both social resources imply a certain degree of cooperative interdependence among team members which has been argued to be crucial for the production of creative output as a group. Teams with strong cooperative norms make team members more willing to contribute to the team’s collective goal and creative success (instead of pursuing individual goals), for example by constructively discussing and building on each other’s ideas (Nijstad & De Dreu, 2012; Tjosvold, 1998). In their meta-analysis, Hülsheger and colleagues (2009) demonstrated that various indicators of cooperation such as team cohesion and participative safety are important for creative and innovative activities as it stimulates team members to interact with each other, and facilitates the exchange of ideas within a supportive and non-threatening team atmosphere. Similar results have been reported by Taggar (2002) who showed that aggregated individual-level creativity was positively related to team-level creativity when groups demonstrated cooperative behavior. In the present study, we advance these two team social resources as key antecedents of team
creativity as we will argue that they shape a collective state of task engagement within project teams that have to produce creative outcomes.

Collective task engagement is defined as a positive, fulfilling, work-related state of mind that is characterized by team vigor, dedication, and absorption which emerges from the interaction and shared experiences of members of a workgroup (Salanova, Llorens, Cifre, Martinez, & Schaufeli, 2003). Vigor refers to the energetic component of task engagement that implies high levels of energy and mental resilience while working, putting a great deal of effort into a group task and to persist, even when difficulties might occur. Dedication stands for the involvement in a group task by experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. The third dimension of collective task engagement is absorption, which refers to the full immersion in one’s work. People who feel absorbed in their activities or tasks, experience that time passes more quickly and find it hard to detach themselves from their work (Schaufeli, Bakker, & Salanova, 2006).

Theoretically, we argue that team members, who perceive that their team can draw upon social resources, are more likely to feel that their team is collectively engaged because a process of emotional contagion takes place. Emotional contagion or cross-over occurs when positive or negative experiences transfer from one person to the other (Westman, 2001). Emotional contagion between team members may result from unconscious modeling processes (e.g., imitating each others’ behavior) as well as from more conscious cognitive processes (e.g., psychological perspective taking of other team members’ attitudes and emotions) (Bakker & Demerouti, 2009). We expect that positive cross-over of task engagement between team members will be more likely to occur in case of interactions and efficient communication in the pursuit of a common goal or task. Teams that coordinate well are able to identify relevant information and share it quickly among team members, leading to more frequent interaction and positive shared experiences. Similarly, team members from cohesive teams are persistent and supportive in pursuing shared goals and thus, will frequently display positive attitudes and encouragement to each other. Thus, we expect that social intra-team dynamics (i.e., team social resources) will be particularly conducive in reaching a collective state of engagement.
In accordance with the JD-R model, a substantial body of research highlighted the desirable outcomes of employee work engagement for organizations such as increased proactive behavior of employees (Salanova & Schaufeli, 2008), higher financial returns (Xanthopoulou et al., 2009) and decreased turnover intentions (Schaufeli & Bakker, 2004). Although most of the literature on engagement has been focused at the individual level, recent research has demonstrated that similar patterns of functioning may occur at the team-level (e.g., Gracia, Salanova, Grau, & Cifre, 2012; Salanova, Llorens, & Schaufeli, 2011). In fact, there is some preliminary evidence supporting the role of collective task engagement as a psychological mechanism to affect team performance. Salanova, Agut and Peiró (2005) demonstrated that collective work engagement mediated the relationship between organizational resources and service climate, which in turn influenced collectively appraised employee performance and customer loyalty in the service sector. However, we argue that collective task engagement will be particularly important for the performance of project based teams on creativity tasks, given the demanding nature of such activities. Creativity tasks require sizeable cognitive flexibility, effort and persistence as new approaches have to be explored in order to find an adequate solution for a specific problem. Drawbacks or difficulties are likely to be encountered during such activities, and thus, the success of creative teams depends strongly on their ability to surmount these obstacles. Persistent team vigor, dedication, and absorption should be crucial characteristics of teams that are able to maintain focused team effort in the face of obstacles (Mumford & Gustafson, 1988; Zhou, 1998). Furthermore, as task engagement refers to the experience of a positive state of affective and motivational fulfillment at work, this should facilitate experimenting, trying out new behavioral strategies and thus, stimulate creativity.

Hence, the present study aims to test a process model linking team social resources as antecedents, collective task engagement as an intermediate process and team performance on a creativity task as a dependent variable (see Figure 1). Specifically, we argue that when project based teams are involved in a creativity task, they are more likely to experience a collective state of task engagement when they have sufficient social resources at their disposal.
Hypothesis 1: Throughout the course of a creativity task episode, team social resources positively relate to collective task engagement.

To test whether actively engaged teams are more likely to perform better on creativity tasks and are indeed better prepared for challenges that are associated with such activities, we assessed team performance on a creativity task by aggregating team members’ individual perceptions of their team’s achievements on the creativity task. Additionally, apart from team members’ perceptions of the team’s performance on each creativity task, we also incorporated independently rated creativity scores of the team’s task output. Traditionally, creativity research has relied on self-reports of both predictor and outcome variables. This is problematic as Hülsheger and colleagues (2009) demonstrated that if team-level processes are assessed by the same people who have rated their own performance, this inevitably leads to overestimated effect sizes. Hence, the following hypotheses are formulated:

Hypothesis 2a: Throughout the course of a creativity task episode, collective task engagement positively relates to team perceived performance.

Hypothesis 2b: Throughout the course of a creativity task episode, collective task engagement positively relates to independently rated creativity of the task output.

Reciprocal relationship between team social resources and creative performance

Thus far, we have proposed an indirect effect of team social resources on team creative performance by integrating collective task engagement as an underlying motivational mechanism throughout the course of a specific creativity task episode. However, work-related resources (e.g., cognitive, motivational or behavioral) do not exist in isolation, but are dynamic and evolve as teams engage in various tasks or activities over time (Marks, Mathieu, &
What Makes Creative Teams Tick? (Zaccaro, 2001). In fact, previous research has raised ambiguity regarding the direction of relationship between social resources (e.g., team cohesion) and team performance; suggesting that these constructs might be reciprocally related with each other (Kozlowski & Ilgen, 2006; Mullen & Copper, 1994). This may be especially true for project teams or temporary teams, which have scarce past references. Hence, the perceived immediate success on previous tasks may be one of the main predictors of future team social resource development, as other common experiences are lacking.

In the present study, we expect a reciprocal effect of team creative performance on future team social resources. It is our contention that collective perceptions of having successfully performed a creativity task will influence the development of future team social resources. Team members who perceive that they performed well as a team on a creativity task, will gain confidence in their team members and accordingly, are expected to increasingly rely on the competencies and abilities of their team. This should be beneficial for the social integration of team members and thus enhance the acquisition of future team social resources as team members will be more likely to collaborate and help each other during subsequent task episodes. This reasoning is based on the principle of team regulation, which describes team performance as a dynamic and cyclic process where team actions are directed toward the accomplishment of specific goals; where team social resources are allocated to optimal teamwork; and progress perceptions lead to the revision of subsequent effort investment and the adaption of working strategies in order to resolve the discrepancy between goals and performance (Kozlowski, Gully, Nason, & Smith, 1999; Kozlowski & Ilgen, 2006). In this regard, perceptions of success (i.e., mastery experiences) are said to affect subsequent task performance as it shapes the development of resources such as efficacy beliefs (Bandura, 1991, 1997). This line of thought is also consistent with Conservation of Resources theory (COR; Hobfoll, 2001), which argues that people not solely tend to protect their current resources (i.e., personal, social or environmental) but also constantly strive to accumulate and develop new resources which results in resource caravans (Xanthopoulou et al., 2009). According to the COR theory,
these reciprocal gain spirals are initiated by obtained resources that promote the acquisition of future, greater resources.

Hence, in addition to the hypothesized indirect effect of team social resources through collective task engagement on team creative performance, we expect that teams who perceive to have performed well during a specific creativity task episode, are more likely to further develop their social resources (i.e., efficient team coordination and strong team cohesion) which will in turn, be beneficial for team creative performance during a subsequent task episode.

_Hypothesis 3_: Perceived team performance on a creativity task positively relates to the development of future team social resources at a subsequent task episode.
Figure 1. Hypothesized research model
METHOD

SAMPLE AND PROCEDURE

The present study adopted a three-wave design, involving 605 individuals participating in an organizational simulation exercise that consisted of three different team creativity tasks. Participants were recruited through a university webpage built for this purpose and also through advertising at university panels. Each participant received a financial reward (20 €) for taking part in the three tasks. A heterogeneous sample was composed with university students (71.6%) from different degrees (Psychology, Languages, Economics, Law, Design, Engineering, etc.), full time workers (16.8%) from a wide range of occupations, and unemployed people (11.6%). Participants were randomly assigned to the final 118 groups that were similar in magnitude (i.e., four to six members each) and structure (i.e. similar combination of students, employed and unemployed people). 35.7 % of the participants were men and the average age was 25.3 year. Participants were told that the purpose of this study was to investigate how teams function in the context of a creativity project.

Each team was brought together during three laboratory sessions, one session per week during three consecutive weeks, to work on a creativity task. All teams were clearly explained that the goal of the tasks was aimed at achieving creative outcomes. Although all three tasks concerned a creativity assignment, the specific content of each task varied in order to avoid learning effects (Ziessler & Nattkemper, 2001). At time 1 (T1), groups were instructed that they were a team that worked for an organization that sells toys. Specifically, during the subsequent three sessions they would have to perform a team creativity task (i.e., in the sense that their output had to be novel and adequate) and that they would have 40 minutes to complete their task. These instructions were repeated during each session. The first session (T1) comprised an idea generation task as teams had to come up with one creative slogan that promoted their organization. One week later (T2), teams came together to work on a second creativity task. Teams were instructed to develop a prototype of a ‘toy’, made out of recyclable materials (equal for all teams). One week later (T3), teams performed a final task and had to design a poster that promoted
their toy. After each task, participants were asked to complete a questionnaire that assessed the variables under study.

**Measures**

**Team social resources.** We assessed ‘team social resources’ by measuring team coordination (three items, e.g., ‘My team was able to efficiently manage unexpected situations’, Salanova, Llorens, Cifre, & Martínez, 2012) and team cohesion (three items, e.g., ‘The task has been realized in an amicable and pleasant atmosphere’, Price & Mueller, 1986). Items were answered on a 7-point Likert-scale going from 0 (never) to 6 (always).

**Collective task engagement.** We assessed ‘collective task engagement’ (Salanova et al., 2003) by measuring three dimensions: Vigor (three items, e.g., ‘During the realization of the task, my team felt full of energy’), dedication (three items, e.g., ‘My team was enthusiastic about the task’), and absorption (three items, e.g., ‘Time flew when my team was working on the task’). Items were answered on a 7-point Likert-scale going from 0 (never) to 6 (always).

**Perceived team performance.** We assessed ‘perceived team performance’ by three items adopted from the scale of Goodman & Svyantek (1999) (e.g., ‘In my team, we achieved the goals of the task’). Items were answered on a 7-point Likert-scale going from 0 (totally disagree) to 6 (totally agree).

**Task output creativity.** We assessed the creativity of each task output based on the creativity assessment procedure of Baer and colleagues (2010). Specifically, team outputs of all creativity tasks were evaluated by three external coders: one expert judge (i.e., somebody with professional expertise concerning the particular creativity task) and two researchers (not involved in the study) who received creativity assessment training. Creativity was defined in terms of ideas that are both original and useful (Amabile, 1988). During the assessment training, the raters were instructed to individually assess the creativity of 3 randomly selected team task outputs (0 = ‘Not at all creative’ to 6 = ‘highly creative’). After completing their individual evaluations, the raters compared their scores and discussed possible disagreements. In a second step, all three raters were instructed to independently score the creativity of each
team task output. This procedure was repeated for each creativity task (i.e., T1: slogan, T2: toy, T3: poster). To construct the creativity score for each team task output, creativity ratings were averaged across the three coders. To examine whether aggregation across raters was justified (to obtain an aggregated score for task output creativity), in other words to assess interrater agreement, the intraclass correlation coefficient (ICC1 & ICC2; Bliese 2000) and RWG values (George & Bettenhausen, 1990; James, Demaree, & Wolf, 1984) were calculated. The average ICC1 value was .37, ranging from .29 (i.e., T2 creativity) to .44 (i.e., T3 creativity). The average ICC2 value was .63, ranging from .55 (i.e., T2 creativity) to .70 (i.e., T3 creativity). The average RWG value was .71, ranging from .64 (i.e., T1 creativity) to .80 (i.e., T3 creativity). Taken together, all measures were acceptable, suggesting adequate levels of agreement, thereby justifying aggregation across the three raters (Bliese, 2000; LeBreton & Senter, 2007).

**ANALYTICAL APPROACH**

We computed the means, standard deviations, Cronbach’s alpha coefficients and bivariate correlations for all scales. First, as a preliminary step, we tested the measurement model. Following Caprara, Pastorelli, Regalia, Scabini, and Bandura (2005), Confirmatory Factor Analyses (CFA) were computed to differentiate the constructs of team social resources, collective task engagement and perceived team performance. Three models were tested: (1) A one-factor model which hypothesized that all constructs were the expression of a single latent factor (i.e., all the covariances were fixed at 1); (2) An orthogonal model which assumed that all constructs were independent of each other (i.e., all the covariances were fixed at 0); and (3) an oblique model which assumed that the factors interrelated (i.e., all the covariances were freely estimated).

Second, in order to statistically justify the aggregation of the team members’ survey responses to the team level (i.e., team coordination, team cohesion, collective task engagement and perceived team performance), various indices were calculated; we used intraclass correlation coefficients (i.e., ICC1 and ICC2) and also within-group interrater agreement (i.e., RWG; James, Demaree, & Wolf, 1984). Values that exceed .12 for ICC1 indicate an adequate level of
within-unit agreement (James, 1982). For the ICC2, values higher than .60 are recommended by Glick (1985). Although some debate exists between the cut-off point of RWG, according to LeBreton and Senter (2007) values that range between .51 and .70 offer a moderate agreement and values between .71 to .90 offer strong agreement.

Structural Equation Modeling (SEM) (using AMOS 19) was employed to test our hypothesized research model (see Figure 1). By means of a cross-lagged structural equation model, several competing models were fitted to the data in several steps. First, the Stability Model (M1) was tested without cross-lagged structural paths, but with temporal stabilities and synchronous correlations (i.e., including paths going from team social resources to collective task engagement, from collective task engagement to perceived team performance, and from collective task engagement to task output creativity). Temporal stabilities were specified as correlations between the corresponding constructs at T1, T2 and T3. The stability model (M1) estimated the total stability coefficient between T1, T2 and T3 without specifying the variance in direct or indirect paths (Pitts, West, & Tein, 1996). Second, the fit of this stability model was compared to four more complex models that were nearest in likelihood to the hypothesized structural model: (1) the Causality Model (M2), which is identical to M1 but includes additional cross-lagged structural paths from T1 team social resources to T2 collective task engagement, to T2 perceived team performance and T2 task output creativity, from T1 collective task engagement to T2 perceived team performance and T2 task output creativity, as well as the same relationships between T2 to T3 variables; (2) the Reversed Causation Model (M3) which is also identical to M1, but includes additional cross-lagged structural paths from T1 perceived team performance to T2 collective task engagement and T2 team social resources, and from T1 collective task engagement to T2 team social resources, as well as the same relationships between T2 to T3 variables; the Full Reciprocal Model (M4), which includes reciprocal relationships among team social resources, collective task engagement and perceived team performance at three waves, therefore, includes all the paths of M2 and M3; the Hypothesized Model (M5) which is identical to M1, but also includes reciprocal relationships among team social
resources and perceived team performance at the three waves: namely a cross-lagged structural path going from T1 perceived team performance to T2 team social resources, as well as a path going from T2 perceived team performance to T3 team social resources (see Figure 1). In addition, the measurement errors of the corresponding indicators of T1, T2 and T3 were allowed to covary over time. According to Pitts et al. (1996), the covariation of the corresponding measurement errors over time accounts for the systematic (method) variance associated with each specific indicator (McArdle & Bell, 2000; Pitts et al., 1996). In fact, failing to specify the covariances between the measurement errors leads to an overestimation of the size of the stability coefficients and, therefore, to a poor model fit.

Model fit. Maximum likelihood estimation methods were used in order to test the different models. The goodness-of-fit of the models was evaluated, using absolute and relative indices. The absolute goodness-of-fit indices calculated were: the $\chi^2$ Goodness-of-Fit Statistic, the relative $\chi^2$ test, Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and the Root Mean Square Error of Approximation (RMSEA). Because $\chi^2$ is sensitive to sample size, the probability of rejecting a hypothesised model increases when sample size also increases. To overcome this problem, the computation of relative goodness-of-fit indices is strongly recommended (Bentler, 1990). Following Marsh, Balla and Hau (1996), three such fit indices were computed: (1) the Comparative Fit Index (CFI); (2) the Incremental Fit Index (IFI); and (3) the Non-Normed Fit Index or Tucker-Lewis Index (TLI). Since the distribution of GFI and AGFI is unknown, no critical values exist. Values smaller than .08 for RMSEA are indicative of an acceptable fit, while values greater than 0.10 should lead to model rejection (Browne & Cudeck, 1993). As a rule of thumb, the values for CFI, IFI, and TLI greater than .90 are considered a good fit (Hoyle, 1995). Finally, we computed the Akaike Information Criterion index (AIC; Akaike, 1987) and the Expected Cross-Validation Index (ECVI) to compare competing models because it is particularly well suited for comparing the adequacy of non-nested models that fit to the same correlation matrix. The lower the AIC and ECVI indices, the better the fit is. The various models were compared by means of the $\chi^2$ difference test (Jöreskog & Sörbom, 1996).
RESULTS

DESCRIPTIVES AND AGGREGATION ANALYSIS

Table 1 presents means, standard deviations, internal consistencies (Cronbach’s alpha) and bivariate correlations of all variables in the study. All Cronbach’s alpha coefficients meet the criterion value of .70 (i.e., ranging from .76 to .92).

Across all survey variables in the present study, the average ICC1 value was .22, ranging from .11 (i.e., perceived team performance T1) to .31 (i.e., perceived team performance T2). The average ICC2 value was .58, ranging from .39 (i.e., perceived team performance T1) to .70 (i.e., perceived team performance T2) and the average RWG value was .85, ranging from .82 (i.e., team coordination T1) to .91 (i.e., team cohesion T1). Although ICC1 and RWG values are in line with past research concerning data aggregation (e.g., James, 1982; James et al., 1984), the ICC2 values are quite low. However, Bliese (1998) delineated that ICC2 values are a function of ICC1 values and group size. Due to the relatively modest group size in the present study (i.e., only 4 to 6 members per group), ICC2 indices were somewhat lower in magnitude. Bliese argues that such lower reliability scores might weaken the relationships that are observed at the group level. Additionally, as noted by Hofmann & Jones (2005), results that are based on measures with lower ICC2 values, should be interpreted as more conservative given possible attenuation. Hence, given the satisfactory ICC1 and RWG values and taking the less than optimal ICC2 values into account, we proceeded to aggregate the survey variables of the present study.
### Table 1

**Descriptive statistics, correlation coefficients and Cronbach’s α**

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<th>Variables</th>
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<th>SD</th>
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<td>1. Team Coordination T1</td>
<td>4.63</td>
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<td>.58**</td>
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<td>.63**</td>
<td>.45**</td>
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<td>5. Team Cohesion T2</td>
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<tr>
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Note. N = 118. Internal correlations are presented at the team level. Internal consistency values (Cronbach's α coefficients) appear across the diagonal in parentheses. N.A. = not applicable. T1 = Creativity task 1, T2 = Creativity task 2, T3 = Creativity task 3; † p < .10; * p < .05; ** p < .01.
CONFIRMATORY FACTOR ANALYSIS

Table 2 shows the results of the confirmatory factor analysis at the team member level of our measures among T1 team social resources, collective task engagement and perceived team performance. The chi-square ($\chi^2$) of all the models was statistically significant; the oblique model shows the best fit indices (see AIC; Akaike, 1987) and meet the criteria, $\chi^2$ (116, $N = 605$) = 274.75, $p < .001$ (GFI = .95; AGFI = .93 ; RMSEA = .05; CFI = .98; IFI = .98; TLI = .97; AIC = 384.75). These results confirm that team social resources, collective task engagement and perceived task performance are interrelated variables but are distinct constructs.

Table 1

<p>| Fit indices of confirmatory factor analyses ($N=605$) |</p>
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<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSEA</th>
<th>CFI</th>
<th>IFI</th>
<th>TLI</th>
<th>AIC</th>
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<td>.94</td>
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<td>3. Oblique model</td>
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<td>.98</td>
<td>.97</td>
<td>384.75</td>
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Note. $\chi^2$ = Chi-square; df = degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC= Akaike Information Criterion.

TESTING THE HYPOTHESIZED STRUCTURAL MODEL

Table 3 shows the overall fit indices of the five competing models of our study. Results confirm the robustness of the Hypothesized Model (M5): ‘$\chi^2$ (165) = 239.81, $p < .001$, IFI = .97, TLI = .96, CFI = .97, RMSEA = .062, AIC = 371.808, ECVI = 3.178’. Moreover, M5 also shows superior fit compared to the four alternative models that were tested; namely the Stability Model (M1) [Delta $\chi^2(13) = 139.79$, $p < .001$; ECVI = 4.150], the Causality Model (M2) [Delta $\chi^2(3) = 84.36$, $p < .001$; ECVI = 3.848], the Reversed Causality Model (M3) [Delta $\chi^2(7) = 129.54$, $p < .001$; ECVI = 4.165] and the Full Reciprocal Model (M4) [Delta $\chi^2(3) = 64.59$, $p < .001$; ECVI = 3.781]. Structural path coefficients of the Hypothesized Model (M5) are presented in Figure 2.
Table 3

*Fit of the alternative research models (N=118)*

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<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2/df$</th>
<th>GFI</th>
<th>AGFI</th>
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<td>.90</td>
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<td>a= 64.59(3)***</td>
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*Note.* $\chi^2$ = Chi-square; $df$ = degrees of freedom; GFI = Goodness-of-Fit Index; AGFI = Adjusted Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; IFI = Incremental Fit Index; TLI = Tucker-Lewis Index; AIC= Akaike Information Criterion; ECVI= Expected Cross-Validation Index.** $p < .01$; *** $p < .001$; a = Chi-square differences.
Figure 2. Structural path coefficients of the hypothesized model (M5). The hypothesized model controls for the temporal stability between all measures. T1 = Creativity task 1, T2 = Creativity task 2, T3 = Creativity task 3.
The structural relationships of the Hypothesized Model (M5) reveal that team social resources are positively related with collective task engagement at all three waves (supporting Hypothesis 1). More specifically, T1 team social resources are positively related to T1 collective task engagement ($\beta = .87, p < .001$), T2 team social resources are positively related to T2 collective task engagement ($\beta = .89, p < .001$) and T3 team social resources are positively related to T3 collective task engagement ($\beta = .78, p < .001$). Support was provided for Hypothesis 2a as we found a positive relationship between collective task engagement and perceived team performance at T1 ($\beta = .73, p < .001$), T2 ($\beta = .68, p < .001$) and T3 ($\beta = .67, p < .001$). Further, collective task engagement is also positively related to task output creativity but only at T2 ($\beta = .34, p < .001$) and T3 ($\beta = .24, p < .01$). At T1, the path going from collective task engagement to task output creativity did not appear to be significant (H2b partially supported). Additionally, in support of Hypothesis 3 regarding the reciprocal effect of perceived team performance on team social resources, we observed significant cross lagged paths going from T1 perceived team performance to T2 team social resources ($\beta = .24, p < .05$) and from T2 perceived team performance to T3 team social resources ($\beta = .26, p < .05$).

**DISCUSSION**

In the present study, we have sought to develop a model of the motivational process (i.e., collective task engagement) that links team social resources to team creative performance at the task level. In addition, we aimed to uncover the mechanisms underlying the development of these team social resources across subsequent creativity task episodes.

In general, our hypotheses were supported as our findings indicate that teams are more likely to perform well on creativity tasks if they have sufficient team social resources at their disposal. More specifically, we observed a sequence of collective psychological experiences leading to team creative performance during the course of three creativity task episodes (i.e., requiring creative output) with team social resources that were positively related to collective task engagement, and in turn collective task engagement that was positively related to both perceived team performance and independently rated
task output creativity (except at T1). Furthermore, we also found a cross-lagged reciprocal relationship between perceived team performance and team social resources. Specifically, teams that perceived to have performed well on a creativity task reported to be better able to coordinate their team activities and experienced stronger team cohesion at subsequent task episodes. These findings support our general line of theorizing that team social resources and perceived team creative performance reciprocally affect each other across subsequent task episodes.

THEORETICAL IMPLICATIONS

The present study extends existing theory on team creativity in a number of ways. First, by exploring the motivational underpinnings of creativity at the team level, the current study contributes to creativity research that has extensively examined and emphasized the importance of motivational processes for creativity at the individual level (e.g., Amabile et al., 1994; Grant & Berry, 2011). Our findings that similar motivational processes are at work in team creativity bode well for the symmetry of creativity findings at the individual and team level. This should inspire future research to benefit from insights at the individual level to model creativity and innovation processes at the team level.

Second, by relying on the JD-R model as a guiding framework and demonstrating the crucial role of collective task engagement, we advance theoretical understanding of how group task motivation affects creativity at the team level during specific task episodes. Specifically, we have identified two team social resources (i.e., team coordination and team cohesion), which initiated collective experiences of task engagement, and in turn this collective task engagement has been shown to be beneficial for the creative performance of teams. In this way, we aimed to establish a theoretical foundation for future research on team-level antecedents of collective task engagement and team creativity.

Third, by adopting a three-wave design, we further extend current theory on the dynamic development of team social resources over a series of creativity task experiences. Specifically, across three subsequent task episodes, we observed cross-lagged effects of positive perceptions of team creative
performance on future team resource development and hence found that reciprocal gains arose between team social resources and perceived team creative performance. As a next step, future research should expand the current model by introducing moderators to further explore the dynamic development of team social resources over time. For example, environmental factors (e.g., creativity support) or leadership styles (e.g., democratic, participative) may moderate the effects of creative performance on team social resources and vice versa, and thus, such a line of research will provide a better insight under which circumstances reciprocal gains between team social resources and team creative performance are more likely to arise.

Fourth, in the present study we assessed creative task performance in two ways; namely ‘perceived team performance’ and ‘task output creativity’. Although it is usually recommended to exclusively rely on independent performance ratings because of the likelihood of method bias (e.g., Gully, Incalcaterra, Joshi, & Beaubien, 2002), this distinction was theoretically relevant for our research model as we hypothesized and found that only shared perceptions of team performance on a creativity task (and hence reflecting a sense of mastery) fuel the development of future team social resources (i.e., and not the independently rated task output creativity as they were not shared with the teams). Furthermore, both types of team performance were positively related to collective task engagement. However, contrary to what was expected, collective task engagement was not related to output creativity at T1. An explanation for this non-significant relationship could be that collective task engagement did not immediately lead to actual creative output (i.e., rated by the external coders) as it was the first time that team members had to work together on a creativity task. This may have affected their creative performance in the sense that ‘new’ teams who are involved in a creative activity and who experience higher notions of collective task engagement may feel satisfied with their performance, however this does not necessarily result in immediate creative output.
PRACTICAL IMPLICATIONS

Our research results may be particularly interesting for organizations that aim to increase organizational creativity through teamwork. Our findings indicate that team creativity benefits from a sufficient amount of team social resources such as coordination and cohesion through their impact on collective task engagement. Hence, team-level interventions that foster team coordination and strengthen team cohesion, may lead to more engaged teams which are in turn more likely to perform well on creativity tasks. In fact, on the long term, such interventions may also induce reciprocal gains between team social resources and creative performance.

Our results also indicate that teams who perceive to have performed well on a creativity task are more likely to develop their team social resources in time. This implies that tasks could be strategically adapted in order to initiate and reinforce these reciprocal dynamics. Teams that are assigned to carry out creative activities could start to work on a relative simple creativity task, which makes a successful performance more likely, boosting social resources. Then, as team social resources grow and take shape across subsequent task cycles, teams could gradually move to more complex creativity assignments.

LIMITATIONS

Due to the relative complexity of our design, this study is not without limitations. First, in our study design we used three different creativity tasks to avoid learning effects among participants. Although all three tasks concerned a creative activity, team output differed across the three tasks what may have had implications on how the team output was evaluated across the three tasks. On the other hand, given the fact that we found similar effects across the three tasks, attests to the robustness of our hypothesized model.

Second, the present study relied on an organizational simulation exercise that was conducted in a controlled setting which yields some benefits but also pitfalls. The main benefit concerns the possibility to compose relative similar teams, and the fact that independent raters could assess the creativity level of each team output. Although the realistic nature of the simulation task, measures were obtained from laboratory groups and not from ‘real’ organizational teams.
Notwithstanding, this does not necessarily imply that the findings of the present study are less relevant for organizations as they also frequently rely on project based teams with members that previously did not work together in order to carry out specific creative activities. In sum, additional research could seek to replicate these findings using a field study design in order to guarantee the external validity of our findings.

**Conclusion**

We can conclude that the relationship between team social resources and team creativity is complex and should be studied longitudinally in order to capture its dynamic nature. The present study advances collective task engagement as a crucial motivational process underlying a team’s performance on a creativity task. Our findings suggest that organizations can facilitate collective task engagement and team creativity and even initiate reciprocal gains by stimulating specific team social resources such as team coordination and team cohesion.
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CHAPTER 6

GENERAL DISCUSSION

ABSTRACT
In the present dissertation, four challenges for current innovation research have been raised to substantially advance knowledge on the motivational underpinnings of creative and innovative processes. These challenges served as a general outline for the primary objectives of the present dissertation. This general discussion provides an overview of the empirical findings of this dissertation. Next, a discussion of theoretical and practical implications is provided. Finally, limitations and avenues for future research are delineated.
RESEARCH OVERVIEW

This dissertation addresses a number of fundamental challenges for current innovation research in its pursuit to adequately capture the motivational underpinnings of creativity and innovation processes at work. First, we aimed to re-conceptualize the relationship between motivational states, creativity and innovative work behavior by taking a reciprocal perspective on innovation processes as being dynamic, cyclical and longitudinal. Second, we wanted to provide new theoretical perspectives to deepen knowledge on the motivational processes that drive creativity and innovation at a team-level. Third, to account for the social realm in which creativity and innovation emerges, we aimed to identify several socially embedded processes and boundary conditions that affect the dynamic motivation-innovation relationship. Finally, we sought to gain a clearer sense of the unique motivational conditions that may stimulate exploration and exploitation activities which are both crucial for creative and innovative work. In addition to the theoretical and methodological contributions of the present dissertation, our findings can also be an onset for practitioners and educators to establish more effective strategies and interventions to facilitate creative and innovative work behaviors. In the sections that follow, I will recapitulate the main findings of all empirical studies in terms of the four key research challenges that were identified in chapter 1.

RESEARCH CHALLENGE 1: CYCLICAL NATURE OF INNOVATION

This first challenge results from the rather static approach that previous work has taken on the relationship between motivation and innovation by examining innovation as a linear process with a discrete endpoint. In the present dissertation, we argue that this perspective does not allow an appropriate representation of the dynamic relationship between the development of motivation and innovative work behavior across time. In trying to address this first challenge, we have taken a step beyond previous research by studying the occurrence of motivational gain cycles across innovation processes. More specifically, we investigated the extent to which motivational states and creative or innovative work behavior are reciprocally related, with motivation affecting
behavior and vice versa. The findings presented in chapter 2, 3 and 5 provided empirical support for this reciprocal perspective.

In chapter 2, an alternative theoretical and methodological rationale was adopted to examine the relationship between intrinsic motivation and innovative work behavior. Specifically, this study advanced the idea that momentary levels of intrinsic motivation not only precede but also may follow from innovative work behavior. The proposed reciprocal effect between intrinsic motivation and innovative work behavior resonates with a basic feature of self-determination theory, namely that engaging in behavior can enhance subsequent motivational states if three basic psychological needs are satisfied (i.e., need for autonomy, relatedness, and competence) (Deci & Ryan, 2000; Greguras & Diefendorff, 2010). The results of this study, based on longitudinal data from participants of an innovation boot camp (i.e., comprising a six-day period), provided support for our reciprocal model. First, we observed that at a daily level, basic need satisfaction influenced innovative work behavior through its positive effect on intrinsic motivation. In addition, we also found evidence for reversed effects; from innovative work behavior on the combined satisfaction of these three psychological needs as measured at each subsequent day. Hence, this finding highlights the beneficial consequences that engaging in innovative work behavior may have for subsequent motivational states. However, data of this study also revealed that one of the five analyzed reciprocal links between day-level innovative work behavior and subsequent basic need satisfaction appeared to be negative. This observation was not expected and suggests that the motivational potential of engaging in innovative work behavior is not always fully realized.

In chapter 3, we further elaborated on these previous findings by examining the conditions under which innovative work behavior is more likely to be associated with motivational benefits. In line with chapter 2, we started from the notion that carrying out innovative activities may spur motivational gains in terms of enhanced basic need satisfaction. However, we proposed that this relationship would be contingent on two specific boundary conditions which
indirectly and directly referred to perceptions of social support (i.e., perceived success and support for innovation), a psychological concept that has been acknowledged by self-determination theory to contribute to the satisfaction of basic psychological needs (Deci et al., 2001). We carried out a second longitudinal field study in a similar setting as described in chapter 2 to test our assumptions. Results indicated that both boundary conditions indeed enabled the positive relationship between innovative work behavior and subsequent basic need satisfaction.

Overall, findings of chapter 3 complement the theoretical rationale that was established in chapter 2 by providing insights on the circumstances under which the reversed effect of innovative work behavior on subsequent basic need satisfaction is more likely to occur. Although the emergence of reciprocal gains was also a research question of interest in chapter 5, this study will be discussed in the next section given its clear focus on team-level processes.

**Research Challenge 2: Multi-level nature of innovation**

A second research challenge that we aimed to address in this dissertation concerns the need to expand knowledge on the motivational processes that underlie team creativity and innovation. Whereas chapter 2 and 3 focused on the reciprocal gains of basic need satisfaction and innovative work behavior among individuals, in chapter 5 we developed a research model to investigate the reciprocal relationship between team social resources, collective task engagement, and team creativity. To test how this reciprocal process would unfold in time, we relied on a three-wave longitudinal organizational simulation exercise in which project teams conducted a series of creativity tasks. First, we introduced collective task engagement as a team-level motivational state that we derived from the job demands-resources model (Bakker & Demerouti, 2007; Salanova, Agut, & Peiró, 2005). We found that during the course of each creativity task episode, collective task engagement served as an underlying mechanism for explaining the impact of team social resources on team creativity (i.e., self-perceived and independently assessed creativity). In support of our hypothesized reciprocal effect, we also observed cross-lagged relationships
between perceived team creative performance on team social resources as measured at each subsequent task episode.

**Research Challenge 3: Social Nature of Innovation**

This third challenge involves the search for knowledge on features of the social context that are conducive for creativity and innovative work behavior. Creativity and innovation typically depend upon the support, resources, knowledge and approval of other actors in the broader environment (Axtell et al., 2000). Therefore, the dynamic relationship between motivation, creativity and innovation cannot be understood in isolation from the social context in which innovation occurs. Although, the social nature of innovation processes has been a recurring theme in the theoretical rationale of all chapters of this dissertation, in chapter 3 and 5 we have explicitly examined socially embedded phenomena.

In chapter 3 we demonstrated that two boundary conditions: perceived success and support for innovation, influenced the positive relationship between innovative work behavior and subsequent basic need satisfaction. Although the findings of this study have been discussed in the section above, I would like to briefly elaborate on the rationale behind these interaction effects by shedding light on the social nature of both boundary conditions. More specifically, perceived success and support for innovation have in common that they indirectly or directly are related to appraisals of social support. For what concerns the moderating impact of perceived success, we argued that people who felt that their innovative efforts did not result in successful outcomes, would be inclined to attribute this failure to situational causes (i.e., constraining influence of the environment). In contrast, we proposed that perceived success would be ascribed to one’s own behavioral efforts to carry out innovative ideas. Results supported our reasoning as we found that the positive relationship between innovative work behavior and basic need satisfaction only occurred when individuals experienced success (i.e., in the case of high innovative work behavior and low perceived success, the simple slope was not significant). Perceived support for innovation, which is the second boundary condition that
was advanced in this study, represents a direct measure of social support. This construct refers to the extent one’s work environment is perceived as supportive and encouraging toward innovative efforts. The moderating role of support for innovation was explained by the fact that social environments can reinforce or refute the meaning and value that individuals ascribe to their innovative efforts. It was our contention that when people experienced little support for innovation, they would devalue the importance of their innovative efforts. Results revealed that under these circumstances (i.e., low support for innovation), innovative work behavior was not significantly related to subsequent basic need satisfaction. Only when people perceived strong support for innovation, the positive relationship between innovative work behavior and subsequent basic need satisfaction appeared to be positive. This finding is consistent with self-determination theory, postulating that behavior has to be perceived as meaningful to engender basic need satisfaction (Ryan & Deci, 2008).

In chapter 5, we studied how team social processes established the motivational foundation for team creativity during a series of task episodes. More specifically, we proposed team coordination and cohesion as two important social aspects of team functioning (i.e., team social resources), that would be conducive for the development of collective states of task engagement when performing creativity tasks. We argued that social resources would lead to collective task engagement through a process of social contagion which implied the cross-over of positive motivational states among team members. As hypothesized, for each of the three task episodes we observed a positive association between team social resources and collective task-engagement. Furthermore, we found that the development of these social resources was affected by team performance on the previous creativity task. This reversed cross-lagged path going from perceived team creativity to subsequent social resources was explained by the fact that positive perceptions of team creative performance facilitated the social integration of team members and therefore the acquisition of future team social resources.

Overall, findings of chapter 3 and 5 underscore the notion that interpersonal social dynamics are critical to the development of motivational
states within individuals and teams that aim to perform creative and innovative activities.

**Research Challenge 4: Dual Nature of Innovation**

The final research challenge that has been proposed, emerges from the seemingly contradictory nature of creative and innovative work which comprises exploitation as well as exploration processes. Recent work has argued that these processes involve different motivational dynamics, and as a consequence are associated with incremental or more radical forms of creativity and innovation (e.g., Gilson, Lim, D’Innocenzo, & Moye, 2012; Gilson & Madjar, 2011). In this regard, we emphasized that it is both theoretically and practically important to further delineate the motivational conditions that promote or inhibit exploitation and exploration processes and to disentangle the patterns of effects on incremental or radical change.

To do so, in chapter 4 we examined the boundary conditions under which week-level creative self-efficacy (i.e., a proximal motivational state) is more likely to influence one’s creative performance in terms of incremental and radical creativity. It was suggested that creative self-efficacy would affect both types of creativity through different pathways; namely exploration or exploitation. Consequently, we expected that the conditions that would affect both relationships (i.e., between creative self-efficacy and both types of creative output) should differ depending on their influence on exploration or exploitation processes. To test our assumptions, we obtained weekly survey data from individuals that participated in an industrial prototyping project during a period of 14 weeks. Our results indicated that strong feelings of psychological ownership impeded the positive lagged relationship between creative self-efficacy and radical creativity. More specifically, we argued that under these circumstances, individuals were less inclined to engage in exploration activities which are crucial for the production of radical creative ideas. Furthermore, we observed that outcome expectancies regarding one’s creative efforts (e.g., reputational benefits), enabled the positive lagged relationship between week-level creative self-efficacy and incremental creativity. This effect supported our
reasoning that under these circumstances, individuals demonstrated enhanced effort and persistence (i.e., exploitation) which are particularly important for the generation of incremental creative ideas.

**IMPLICATIONS FOR THEORY**

In innovation literature, it is well-established that motivational dynamics are an indispensible factor for innovation processes (e.g., Collins & Amabile, 1999; Grant & Berry, 2011; Janssen & Van Yperen, 2004; Shalley, Zhou, & Oldham, 2004). However, theoretical approaches that account for fluctuations of optimal motivational states that may precede or result from creative and innovative work behaviors are still in development. The present dissertation seeks to add value to this stream of research by providing a more dynamic and detailed view on the relationship between motivation, creativity and innovative work behavior. Based on the results from the four empirical studies included, several implications can be derived.

First, our findings extend the traditional perspective of innovation research which has depicted motivational states exclusively as antecedents of individual innovation (e.g., Amabile, 1985, 1988; Grant & Berry, 2011; Janssen & Van Yperen, 2004; Moenkemeyer, Hoegl, & Weiss, 2012). By drawing on self-determination theory, we introduced basic need satisfaction as a central motivational construct to disentangle reversed causation mechanisms that underlie the relationship between intrinsic motivation and innovative work behavior. Specifically, our results revealed that reciprocal gains between basic need satisfaction (i.e., crucial for the development of intrinsic motivation) and innovative work behavior can arise across subsequent days. This framework can guide future work in this area, which could concentrate on how individuals develop and maintain optimal motivational states during challenging innovation endeavors. In this regard, the beneficial effect of innovative work behavior on basic needs satisfaction is a key element to our understanding of how intrinsic and other forms of autonomous motivation take shape over time. More specifically, self-determination theory posits that basic need satisfaction facilitates the successful internalization of extrinsic motivation into one’s coherent sense of self (i.e., autonomous motivation) (Ryan & Deci, 2000;
Vansteenkiste, Niemiec, & Soenens, 2010). This internalization process of motivation is particularly interesting for innovative work activities, given that
the nature of innovation is rather ‘problem-oriented’ and often emerges from an external need or problem (e.g., an organization that aims to remain competitive, innovation as a response to particular problem or challenge). Hence, to capture the development of optimal motivational states throughout the course of innovation processes, a reciprocal model seems to be a more viable conception of the relationship between basic need satisfaction, intrinsic motivation and innovative work behavior.

In addition to the key role that individuals have themselves in the development and maintenance of their motivation during innovation processes, we found that appraisals of social support may affect the motivational consequences of innovative work behavior. More specifically, we identified perceived success and support for innovation as boundary conditions under which innovative work behavior is more likely to be associated with subsequent basic need satisfaction. In this regard, the social nature of innovative work should be understood not only in terms of the extent to which social contexts can provide cues of support that enable the motivational benefits of innovative work behavior but also in terms of the extent to which a lack of social support can disrupt processes of motivational gains. This argument suggests the contours of a more comprehensive model of the development and maintenance of optimal motivation throughout innovation processes, a model that incorporates the interaction between individual and social influences. Future research could adopt this model, which is derived from self-determination theory, to identify other social-contextual conditions that may facilitate or impede the beneficial motivational consequences of innovative work behavior.

Our findings do not only yield important implications for research on the relationship between motivation and innovative work behavior. This dissertation also contributes to the literature on creativity, which is considered to be the initial step in the broader innovation process (Shalley et al., 2004). Consistent with our dynamic perspective on the emergence of motivated behavior during innovation processes, we studied the boundary conditions in which motivational
states are more likely to lead to subsequent idea generation efforts. To do so, we built on previous work of Tierney and Farmer (2002) which introduced creative self-efficacy as a proximal motivational state that is conducive to the creative performance of individuals. More specifically, we deepened theoretical understanding of how states of creative self-efficacy may instigate explorative as well as exploitative processes by distinguishing two types of creative output; radical (i.e., requiring exploration) and incremental creativity (i.e., requiring exploitation). Our theoretical rationale for the two distinct routes that connect creative self-efficacy with both types of creativity was further substantiated by our findings that the unique boundary conditions that influence both relationships, differ depending on whether they promote or impede either more explorative (i.e., idea ownership) or exploitative processes (i.e., outcome expectancy). These results draw attention to the importance of differentiating between exploitation and exploration processes as they have different implications for the creative performance of individuals and are therefore likely to emerge in distinct circumstances.

This dissertation also lends support to the notion that the underlying motivational dynamics of creativity is a phenomenon that generalizes to teams. This complements research that has extensively studied motivational processes that affect creativity at the individual level and provides an important step towards integrating creativity research findings at different levels of analysis. By extending the job demands-resources model to the team-level, we have provided a theoretical framework that highlights team motivational processes (i.e., collective task engagement) that underlie the relationship between team social resources and team creativity during specific task episodes. Future research could adopt this model to identify new antecedents of team creativity by looking at their potential impact on collective task engagement. Furthermore, we extended theory on how team social resources take shape across a series of creativity task episodes. More specifically, reciprocal gains were observed between team social resources and perceived task performance. This provides avenues for future research to explore the circumstances under which the reversed effect of creative team performance on subsequent team social resources are more likely to occur.
In sum, chapter 5 points out that some parallels can be drawn between motivational processes that are at work in team creativity and motivational mechanisms at the individual-level that were studied in chapter 2 and 3 with regards to their dynamic and reciprocal nature. However, it should be noted that in contrast with chapter 2 and 3, the current study focused on a subcomponent of innovation which mainly corresponds with the idea generation stage of innovation processes. It can be expected that teams that successfully complete the idea generation stage of an innovation process, may also further develop their social resources throughout later (i.e., implementation) stages of the innovation process. More specifically, these acquired social resources and sustained collective engagement could help teams to overcome several challenges that are typically associated with the implementation of ideas such as the necessity of obtaining support of key figures within the organization, sufficient resource allocation or resistance to change (De Dreu, Nijstad, Bechtoldt, & Baas, 2011). However, this rationale is speculative and should be tested in future research.

**IMPLICATIONS FOR PRACTICE**

Organizations that aim to pursue long term survival and success often make great efforts to foster an innovative mindset among their employees to deliver more value creation. For example by organizing workshops to unlock the creative potential of their employees, by providing an inspiring workplace, or by implementing state-of-the-art virtual idea sharing software. However, in spite of an initial enthusiasm that such ‘best practices’ may engender to pursue innovative goals, it can be very challenging for employees to efficiently allocate their motivational resources or to maintain their energy over time. In this regard, our findings can help practitioners and educators to maximize the motivational impact of their current strategies to promote innovation and to provide avenues for the development of new interventions. A number of practical recommendations that were derived from the empirical studies of this dissertation are summarized below.
First, our findings demonstrate that innovative work behavior not only results from preceding motivational states but also has the potential to positively affect subsequent motivation. In this regard, the role of basic need satisfaction has been highlighted as a crucial motivational mechanism in these reciprocal dynamics. More specifically, once individuals engage in innovative work behavior, they may experience increased basic need satisfaction, which in turn can stimulate and perpetuate long-run motivation (chapter 2). Thus, although the above mentioned practices (e.g., creativity workshops) may provide an initial motivational trigger that can lead to behavioral attempts to innovate, the motivational consequences of one’s innovative efforts should not be overlooked. The motivational potential of innovative work behavior has been specifically addressed in chapter 3. We found that individuals who engage in innovative work behavior are unlikely to satisfy their basic psychological needs if they experience little social support regarding their innovative efforts. This suggests that organizations can enhance the emergence of reciprocal gains of motivation and innovative work behavior by providing a context that facilitates basic need satisfaction.

- When employees provide ideas on how to improve current working methods or suggest a concept for a new product (e.g., through an idea suggestion system), then it should be clearly communicated what will happen with their generated ideas and how their efforts contribute to the innovative performance of the organization. Individuals, who perform innovative activities but do not perceive that their efforts are meaningful or have an impact, will be unlikely to satisfy their basic needs. Consequently, this should impede their motivation to undertake subsequent innovative attempts.

- Given that innovative outcomes do not entirely depend on one’s own behavioral efforts but also are contingent on contextual factors (e.g., availability of resources, support; Axtell et al., 2000), individuals run the risk of losing a sense of self-determination when their innovative attempts are not successful. Our results indicate that under such
circumstances, subsequent basic need satisfaction will be obstructed. Therefore, employees who fail to successfully carry out their innovative activities could be encouraged to reflect on their own performance instead of exclusively attributing their failure to external factors (Carette & Anseel, 2012). By drawing attention to their own performance, individuals can identify several learning opportunities that makes subsequent innovative success more likely. Furthermore, it will help them to feel like causal agents with respect to their own innovative actions, which should be conducive for subsequent basic need satisfaction.

- Previous work also points to the role of direct supervisors in creating a supportive work environment for their employees which could help employees to satisfy their basic needs (e.g., Eisenbeiss, Van Knippenberg, & Boerner, 2008; Janssen, Van De Vliert, & West, 2004; Leroy, Anseel, Gardner, & Sels, in press). Employees that engage in innovative activities, for example after having participated in an inspiring creativity workshop, also need to feel supported by their supervisor if their innovative efforts are to be positively associated with subsequent basic need satisfaction. Supervisors can signal support, for example by creating frequent opportunities for feedback interactions with their team members to discuss their ideas.

Second, the present dissertation provides compelling empirical evidence for the malleable nature of creative self-efficacy as an antecedent of individual creativity (chapter 4). More specifically, we found that short-term fluctuations in one’s creative performance resulted from momentary states of creative self-efficacy (i.e., at a week-level). In this regard, the literature on creative self-efficacy has proposed various cost-efficient strategies that practitioners and educators could apply to enhance creative self-efficacy beliefs among their employees or students. For example:
- When individuals are struggling with concerns about their ability to accomplish a creativity task, they could be convinced verbally that they possess the capabilities needed to act creatively. This is particularly efficient when such encouragements are combined with specific feedback on how to improve their current skills (Tierney & Farmer, 2002; VandeWalle, 2003).

- Role models (e.g., colleagues or supervisors) also can influence one’s creative self-efficacy by demonstrating behaviors that are conducive to creativity. This way, individuals are more likely to be persuaded that they are able themselves to engage in creative endeavors or at least have a clearer notion of how they can enhance their own creative abilities (Choi, 2012; Gong, Huang, & Farh, 2009).

- By conveying clear expectations concerning the creative output of their team members, supervisors can demonstrate their confidence in the capacity of their subordinates to be creative. Consequently this should reinforce their creative self-efficacy beliefs (Tierney & Farmer, 2011).

Results of chapter 4 also indicate that increased levels of creative self-efficacy only are more likely to be conducive to one’s creative performance under particular circumstances. Furthermore, depending on whether these boundary conditions promote or impede rather explorative or exploitative processes, different types of creative outcomes can be expected (i.e., radical or incremental ideas). This implies that when developing interventions to enhance creative self-efficacy beliefs of employees or students, it should be clear which type of creative performance is desired. For example, our results indicate that the negative impact of psychological idea ownership should be buffered as it prevents self-efficacious people from seeking new information or feedback that could help them to develop radical ideas. Protective attitudes towards ideas could be reduced by stimulating knowledge sharing and by promoting collaborative behaviors between team-members. In this regard, we recommend the following.
Creativity literature suggests that fostering pro-social motivation among employees may be an adequate strategy, as it encourages people to consider others’ perspectives, stimulates honest knowledge exchange and increases trust within teams (Nijstad & De Dreu, 2012; Steinel, Utz, & Koning, 2010). One way to do this, is to place greater emphasis on collective goals rather than on individual creative achievements, so people are more likely to interact and cooperate when developing their ideas (Baer & Brown, 2012; Goncalo & Staw, 2006).

This dissertation also provides useful insights for organizations that aim to enhance their creative performance through teamwork (chapter 5). Our findings suggest that team creativity can be enhanced by interventions that stimulate team coordination and foster team cohesion. More specifically, when teams have sufficient social resources at their disposal, they are more likely to experience a collective state of task engagement, which in turn is conducive for their creative performance. Moreover, on the long term, interventions that positively affect social resources may also instigate reciprocal gains between team social resources and team creativity. Possible ways to enhance social dynamics within teams are the following:

- Team coordination implies that team members are aware of where expertise is located in their team and how it is accessed and applied in order to achieve certain goals. Hence, stimulating internal communication (e.g., by providing sufficient and adequate communication channels) may contribute to how well teams are coordinated.

- Organizations might consider working with self-managed teams as they require greater collaborative interaction, which leads to greater team cohesion (Seers, Petty, & Cashman, 1995).
Finally our results demonstrate that positive perceptions of team creative performance facilitate the development of team social resources across subsequent task episodes. This suggests that task complexity could be strategically adapted in order to initiate and reinforce these reciprocal gains.

- Teams that have little experience in conducting creative activities could start to work on relatively simple creativity tasks. This should allow them to quickly experience success, and consequently boost their social resources. As team social resources develop across subsequent task experiences, task complexity could be gradually increased towards more challenging assignments.

LIMITATIONS AND AVENUES FOR FUTURE RESEARCH

Like any study, the empirical chapters of this dissertation are not without limitations. First, in two out of four studies (chapter 3 and 4), predictor and outcome variables were measured by self-reports. Therefore, common method variance may be a problem in these studies (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, although it would have been preferable to use peer-ratings or more objective indicators of creative and innovative performance, we tried to minimize common method bias by temporally separating the measurement of our study variables. For example, in chapter 4 we separated the predictor and criterion with a time-lag of one week. This should have helped in reducing common method bias (Podsakoff et al., 2003). Common method bias was less of a concern in the other empirical studies of this dissertation as we relied on peer-rated measures of innovative work behavior in chapter 2 and used independently rated creativity scores in chapter 5.

Second, in three studies (chapter 2, 3, and 4) we exclusively relied on data that was obtained from a student sample. Hence, caution is warranted regarding the interpretation and generalization of our findings. More specifically, these three studies were conducted among industrial product design and engineering students. Participants of all three studies were provided with the opportunity to work on real-life industrial cases that were put together by innovation managers of various participating companies. Furthermore, the
prototypes and concepts that were developed by the participants could be adopted by the collaborating organizations. This illustrates the professional and realistic nature of the context in which these creative and innovative behaviors occurred. Nonetheless, future research needs to replicate these findings in an organizational setting with non-student samples.

Third, in chapter 3 we offer promising initial evidence for the moderating role of perceived success on the relationship between innovative work behavior and subsequent basic need satisfaction. This effect was explained by the fact that perceived success influences the attributions that individuals make regarding their own innovative performance. Although this implies a mediated moderation effect (i.e., perceived success enables the association between innovative work behavior and basic need satisfaction by stimulating internal attribution processes), we could not test this model because causal attributions were not measured in this study. Hence, additional research is necessary to account for the impact of causal attribution processes in this interaction. In a similar vein, in chapter 4 we relied on the underlying mechanisms of exploration and exploitation to explain the impact of creative self-efficacy on two different types of creativity (i.e., radical and incremental creativity). However, future research is needed to assess mediation as we did not incorporate measures of exploration and exploitation in our model testing.

Fourth, in chapter 2 and 3 we relied on the scale of Janssen (2000) to obtain an overall measure of one's day-level innovative work behavior. Consistent with the work of Janssen (e.g., 2000, 2001, 2003, 2004), we found high intercorrelations between the components of innovative work behavior (i.e., idea generation, promotion and realization). Although this scale has been widely used and is a well-respected measure (e.g., Battistelli, Montani, & Odoardi, 2013; Chang, Hsu, Liou, & Tsai, 2013; Yu, Yu-Fang, & Yu-Cheh, 2013), it did not allow us to disentangle separate sequences of specific innovative actions (in terms of idea generation, promotion, and realization). This is because these three components of innovative behavior are typically strongly related, as people can be involved in any combination of these three behaviors at one point in time (Scott & Bruce, 1994). However, an emerging body of research is drawing
attention to the creation-implementation tension (e.g., Baer & Brown, 2012; Bledow, Frese, Anderson, Miriam, & Farr, 2009; Yaping Gong, Zhou, & Chang, 2013). Therefore, disentangling the motivational dynamics that are associated with the three different facets of innovative work behavior, for example in experimental designs, seems a fruitful avenue for further research.

Finally, in all chapters we have adopted longitudinal cross-lagged designs to test our research questions. From a causality standpoint, the longitudinal nature of our data has advantages beyond the majority of existing cross-sectional creativity and innovation studies. However, it should be noted that in the field studies of this dissertation, we opted for short-term time frames (i.e., day-level or week level). This is because our studies took place during ongoing innovation training programs. In designing our data-collection points, we needed to take the timing of these training programs into consideration which has led to day-level and week-level time frames. To date, innovation literature has provided little guidance with respect to the identification of adequate time frames to study proactive behaviors (e.g., innovative work behavior). For example, prior longitudinal studies in this domain have revealed a wide disparity in timing on data collection intervals, ranging from day-level perspectives (e.g., Fritz & Sonnentag, 2007) to time-lags of several years (e.g., Hakanen, Perhoniemi, & Toppinen Tanner, 2008). These diverse findings point to the fact that theories in work and organizational psychology are often not clear about the timing of processes and developments (Ohly, Sonnentag, Niessen, & Zapf, 2010). Whereas our time frames seem adequate to capture fluctuations in momentary motivational states and innovative work behaviors, the emergence of more mature forms of innovative outcomes (e.g., in organizational settings) would take longer to materialize (Tierney & Farmer, 2011). Hence, future research could adopt different time frames (e.g., months) to study growth trajectories of motivation among participants that engage in long-term innovation processes.
CONCLUDING REMARKS

Organizations that aim to stimulate innovative work performance often come to the conclusion that it is very challenging for their employees to maintain or increase their initial motivation to innovate. This is, in part, due to the fact that most of the attention of so called ‘best practices’ goes to the spark that may initially encourage employees to innovate, but not to the development of motivation during long-term innovation processes. This dissertation contributes among other things to a better understanding of how optimal forms of motivation are established to carry out innovative activities at the individual and team level. In conclusion, current findings are intended to provide a platform and stimulation for further discussion and empirical research on the longitudinal and reciprocal nature of the relationship between motivation, creativity, and innovative work behavior.
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NEDERLANDSTALIGE SAMENVATTING

INTRINSIEKE MOTIVATIE EN INNOVATIEF WERKGEDRAG HERBEKEKEN: WEDERKERIGE RELATIES TIJDENS DE VERSCHILLENDE FASES VAN HET INNOVATIEPROCES.

Organisaties die er naar streven om hun innovatief potentieel te bereiken, hangen in de eerste plaats af van hun eigen werknemers om creatieve ideeën te generen en die uiteindelijk ook verder te ontwikkelen tot concrete innovaties (Janssen, 2000; Scott & Bruce, 1994; West & Farr, 1990; Yuan & Woodman, 2010). Dergelijke bedrijven leveren doorgaans grote inspanningen om innovatief gedrag bij hun medewerkers aan te moedigen door bijvoorbeeld creativiteitsworkshops te organiseren, innovatiepremies uit te reiken, te investeren in inspirerende werkruimtes of het lanceren van state-of-the-art virtuele ideeënfora. Echter, in de praktijk stelt men vaak vast dat na een initieel enthousiasme, de motivatie en gedrevenheid van deze werknemers gaandeweg verminderd. Het is dan ook voor veel innovatienieurs een pijnlijke vaststelling dat, ondanks hun moedige keuze voor dergelijke ‘best practices’, ze er niet in slagen om werknemers te motiveren om op lange termijn bij te dragen tot het innovatief succes van hun organisatie.

De voorbije 30 jaar heeft de rol van werknemermotivatie de creativiteit en innovatie literatuur gedomineerd (Grant & Berry, 2011; Utman, 1997; Zhou, 1998). Verschillende onderzoekers hebben vooral intrinsieke motivatie naar voor geschoven als een cruciale factor voor creativiteit en innovatie op de werkvloer. Meer bepaald, mensen die intrinsiek gemotiveerd zijn, en dus uit eigen beweging activiteiten of taken gaan uitvoeren (eerder dan door het ervaren van externe druk), zullen meer innovatief werk gedrag vertonen. De logica hiervoor is dat intrinsieke motivatie flexibel denken stimuleert waardoor diverse informatie op een efficiëntere manier wordt verwerkt om zo creatieve oplossingen te kunnen bedenken voor een bepaald probleem. Bovendien beschikken intrinsiek gemotiveerde werknemers over meer
doorzettingsvermogen en zijn ze ook bereid om de status-quo te doorbreken door risico’s te nemen en initiatief te tonen (Amabile, Hill, Hennessey, & Tighe, 1994; Unsworth & Clegg, 2010). Kortom, allemaal zaken die hun innovatieve prestatie ten goede komt.

Ondanks de populariteit van dit intrinsieke motivatie perspectief in de innovatie literatuur, blijft het moeilijk om met deze inzichten aan de slag te gaan. Bijvoorbeeld, initiatieven die zich louter richten op mensen die reeds intrinsiek gemotiveerd zijn om te innoveren (zoals het stimuleren van medewerkers om bovenop hun dagelijkse job verplichtingen ook aan innovatieprojecten te werken), zullen slechts een relatief kleine groep bereiken en dus een bescheiden impact hebben op het innovatief succes van het bedrijf. Bovendien wordt intrinsieke motivatie niet op een mechanische wijze geïnduceerd bij mensen. Het is ‘intrinsiek’ en per definitie kan dit dus niet van buitenaf worden opgedrongen.

**HUIDIG DOCTORAATSONDERZOEK**

Dit doctoraat richt zich op een aantal fundamentele problemen en uitdagingen waarmee innovatie onderzoek mee kampt om de dynamische relatie tussen motivatie processen, creativiteit en innovatie op een adequate wijze in beeld te brengen. Ten eerste, de relatie tussen motivatie en innovatief gedrag betreft geen eenvoudig input-output proces (zoals het al te vaak wordt voorgesteld), maar wordt eerder gekenmerkt door een dynamische cyclus met wederkerige invloeden. We stellen dus een herconceptualisatie voorop van deze relatie waarbij motivatie enerzijds kan leiden tot innovatief werk gedrag en anderzijds de ontwikkeling van motivatie ook beïnvloed kan worden door het stellen van innovatief werk gedrag. Ten tweede, in de wetenschappelijke literatuur gaat er tot op heden aanzienlijk meer aandacht uit naar creativiteit en innovatie op het individueel niveau dan op het team niveau. Een belangrijke doelstelling van dit doctoraat is om nieuwe theoretische perspectieven te bieden die een beter inzicht geven in de motivatieprocessen die belangrijk zijn voor team creativiteit en innovatie. Ten derde, creativiteit en innovatie zijn doorgaans ook afhankelijk van de steun, middelen, kennis of goedkeuring van andere actoren in de werk omgeving. De dynamische relatie tussen motivatie,
creativiteit en innovatie kan dus moeilijk begrepen worden los van de sociale
context waarin deze plaatsvindt. Daarom wordt er in het huidige doctoraat ook
onderzocht hoe sociale processen en de context bijdragen tot de ontwikkeling
van optimale motivatie die mensen kunnen aanzetten om te innoveren. Ten
vierde, innovatieprocessen worden gekenmerkt door zowel exploratie als
exploitatie activiteiten. Enerzijds moet er voldoende ruimte zijn om te
experimenteren en om nieuwe kennis te generen, en anderzijds is het ook
belangrijk dat reeds verworven vaardigheden en expertise op een systematische
manier kunnen worden aangewend. In dit doctoraat gaan we dieper in op het
conceptueel onderscheid tussen beide componenten aangezien ze andere
motivatieprocessen impliceren en dus waarschijnlijk ook onder verschillende
condities tot stand komen. Dit doctoraat bestaat uit vier empirische
hoofdstukken waarin één of meerdere van bovenstaande onderzoeksuitdagingen
aan bod komen.

In Hoofdstuk 2 en Hoofdstuk 3 wordt de dynamische relatie onderzocht
zwischen de bevrediging van drie psychologische basisbehoeften (i.e., behoeft aan
autonomie, competentie, en verbondenheid) en innovatief werk gedrag. De
onderzoeksvragen van beide studies worden getoetst aan de hand van een
longitudinaal onderzoeksopzet. Onze steekproef bestaat telkens uit studenten
‘industrieel product ontwerpen’ die deelnamen aan een innovatie boot camp
gedurende een periode van respectievelijk 6 (Hoofdstuk 2) en 7 dagen
(Hoofdstuk 3). Hoofdstuk 2 vertrekt vanuit de zelf-determinatie theorie (Gagne
& Deci, 2005) en vindt in de eerste plaats evidentie voor de mediërende invloed
van intrinsieke motivatie op de relatie tussen behoeftebevrediging en innovatief
werk gedrag. Bovendien tonen de resultaten aan dat de longitudinale relatie
zwischen behoeftebevrediging en innovatief werk gedrag eerder bi-
dan unidirectioneel is, aangezien een hoger niveau van innovatief werk gedrag op
zijn beurt weer leidt tot een sterkere mate van behoeftebevrediging op de
volgende dag. Echter, dit positief effect wordt niet voor alle dagen terugvonden
wat suggereert dat innovatief werk gedrag slechts in bepaalde omstandigheden
een invloed heeft op behoeftebevrediging.

Hoofdstuk 3 bouwt verder op deze bevindingen door de condities te
onderzoeken waarin het stellen van innovatief gedrag tot een sterkere
Nederlandstalige samenvatting

behoeftbevrediging kan leiden. Meer bepaald, in deze studie wordt er onderzocht of ‘percepties van succes’ en ‘steun voor innovatie’ de relatie tussen innovatief werk gedrag en opeenvolgende behoeftbevrediging modereren. De resultaten ondersteunen de moderatiehypothese van deze studie aangezien innovatief werk gedrag enkel positief gerelateerd is met een hoger niveau van behoeftbevrediging (gemeten op de volgende dag) wanneer er voldoende succes wordt ervaren en wanneer de sociale omgeving voldoende steun biedt voor innovatie.


Ten slotte richt Hoofdstuk 5 zich op de dynamische relatie tussen motivatieprocessen en creativiteit bij teams. Op basis van het job demands-resources model (Bakker & Demerouti, 2007), stelt deze studie een onderzoeksmodel voor om de wederkerige invloeden tussen sociale hulpbronnen van teams (‘social resources’), collectieve taak motivatie (‘collective task
engagement’) en team creativiteit te bestuderen doorheen de tijd. Om dit onderzoeksmodel te testen werd een longitudinale simulatieoefening ontwikkeld met drie verschillende creativiteitstaken. Participanten werden onderverdeeld in teams die gedurende drie sessies (één sessie per week) een creativiteitstaak uitvoerden. De resultaten tonen aan dat gedurende elke taak, sociale hulpbronnen (team coördinatie en cohesie) positief gerelateerd zijn met collectieve taak motivatie en dat collectieve taak motivatie op zijn beurt een positieve invloed heeft op team creativiteit. Deze sequentie geeft aan hoe teams optimale motivatie kunnen ontwikkelen dat hen toelaat om goed te presteren op taken die creativiteit vereisen. Ter ondersteuning van het vooropgestelde wederkerige model, stellen we ook vast dat een hogere mate van team prestatie op iedere creativiteitstaak telkens ook tot een hogere mate van sociale hulpbronnen leidt in de volgende taak.

Initiatieven en interventies van organisaties om innovatie bij hun werknemers te stimuleren, lossen zelden de hoge verwachtingen in. Dit is dus deels te wijten aan het feit dat de meeste aandacht gaat naar de vonk die werknemers kan aanzetten om te innoveren, maar dat er weinig gerichte inspanningen worden geleverd om hun motivatie te helpen ontwikkelen. Dit doctoraatsproefschrift draagt onder meer bij tot een beter begrip van hoe kwalitatief goede motivatie tot stand komt om creatieve en innovatieve prestaties te leveren, en op welke manier individuen en teams hun motivatie kunnen behouden en optimaliseren over de tijd heen.
REFERENTIES


RESUMEN EN ESPAÑOL

LA MOTIVACIÓN INTRÍNSECA Y EL COMPORTAMIENTO LABORAL INNOVADOR REVISADO: RELACIONES RECÍPROCAS DURANTE LAS DIFERENTES ETAPAS DEL PROCESO DE INNOVACIÓN.

Las organizaciones que se esfuerzan en lograr su potencial innovador dependen en primer lugar de sus empleados para generar ideas creativas, así como, en ocasiones, para que las sigan desarrollando en innovaciones concretas (Janssen, 2000; Scott & Bruce, 1994; West & Farr, 1990; Yuan & Woodman, 2010). Estas empresas suelen hacer grandes esfuerzos para alentar el comportamiento innovador de sus empleados como por ejemplo, organizando talleres de creatividad, distribuyendo premios sobre innovación, invirtiendo en espacios de trabajo inspiradores o en el lanzamiento de foros virtuales diseñados para compartir ideas. Sin embargo, en la práctica, uno se encuentra a menudo que tras el entusiasmo inicial, la motivación y el compromiso de estos trabajadores disminuye gradualmente. Por lo tanto, muchos gestores de la innovación se enfrentan a la situación de que, a pesar de su valiente elección para este tipo de “buenas prácticas”, no logran motivar a los empleados a contribuir al éxito innovador de su organización a largo plazo.

En los últimos 30 años el rol de la motivación de los empleados ha dominado la literatura sobre la creatividad y la innovación (Grant & Berry, 2011; Utman, 1997; Zhou, 1998). Varios investigadores han calificado la motivación intrínseca como factor crucial para la creatividad y la innovación laboral. En particular, las personas que se encuentran motivadas intrínsecamente, y que por lo tanto realizan las actividades o tareas por su propia iniciativa (en lugar de experimentar la presión externa) muestran un mayor comportamiento innovador en el trabajo. La lógica subyacente de lo mencionado anteriormente es que la motivación intrínseca promueve el pensamiento flexible, por lo que la información diversa se procesa en una manera más eficiente llegando así a soluciones creativas. Así mismo, los empleados motivados
intrínsecamente cuentan con más perseverancia y están dispuestos a romper la rutina tomando riesgos y mostrando iniciativa (Amabile, Hill, Hennessey, & Tighe, 1994; Unsworth & Clegg, 2010). En resumen, estos son factores que benefician el rendimiento innovador de los empleados.

A pesar de la popularidad de esta perspectiva sobre la motivación intrínseca en la literatura en innovación, sigue siendo difícil poder llevar estos conocimientos teóricos a la práctica. Por ejemplo, las iniciativas que se centran únicamente en las personas que se encuentran intrínsecamente motivadas para innovar (ej. alentar a los empleados a trabajar, más allá de sus obligaciones diarias, en proyectos innovadores), sólo llegan a un grupo relativamente pequeño y, por lo tanto, tienen un impacto modesto en el éxito innovador de la empresa. Además, la motivación intrínseca no se induce de manera mecánica en los seres humanos. Es ‘intrínseca’ y por lo tanto, por definición, no puede ser impuesto desde factores externos al individuo.

**TESIS DE INVESTIGACIÓN**

La presente tesis se centra en una serie de cuestiones y desafíos fundamentales a los que la investigación sobre innovación se está enfrentando para poder entender de una manera adecuada la dinámica entre los procesos de motivación, la creatividad y la innovación. En primer lugar, la relación entre la motivación y el comportamiento innovador no es un proceso sencillo de ‘input-output’ (como se sugiere a menudo), sino más bien se caracteriza por un ciclo dinámico de influencias recíprocas. Por tanto, proponemos una re-conceptualización de esta relación en la que la motivación puede afectar por un lado el comportamiento laboral innovador; y por el otro lado que el desarrollo de la motivación puede estar influido por el comportamiento laboral innovador establecido anteriormente. En segundo lugar, hasta la fecha la literatura científica le ha otorgado considerablemente más atención a la creatividad y la innovación a nivel individual que a nivel de equipo. Un objetivo principal de esta investigación es el desarrollo de nuevas perspectivas teóricas para proporcionar una mejor comprensión de los procesos motivacionales que influyen en la creatividad y la innovación en equipo. En tercer lugar, la creatividad y la innovación, en general, dependen también del apoyo, los
recursos, el conocimiento o la aprobación de otras personas en el entorno laboral. La relación dinámica entre la motivación, la creatividad y la innovación puede ser difícil de entender si no se considera el contexto social en el cual ocurre. Por lo tanto, en la presente tesis también se ha examinado cómo los procesos sociales y el contexto contribuyen al desarrollo del nivel de motivación óptima responsable de alentar a las personas a innovar. En cuarto lugar, los procesos de innovación se caracterizan tanto por las actividades de exploración como de explotación. Por un lado, debe haber suficiente espacio para experimentar y para generar nuevos conocimientos, y por el otro lado, también es importante que las habilidades y la experiencia adquiridas sistemáticamente puedan ser utilizadas. Esta tesis se centra en la distinción conceptual entre los dos componentes, ya que implican diferentes procesos de motivación y, por tanto, probablemente también pueden emerger en diferentes condiciones. Esta tesis doctoral consta de cuatro capítulos empíricos en los que se abordan los anteriores retos de investigación mencionados.

En el capítulo 2 y el capítulo 3, se examinó la relación dinámica entre la satisfacción de las tres necesidades psicológicas básicas (es decir, la necesidad de autonomía, competencia y relación) y comportamiento innovador en el trabajo. La investigación de ambos estudios se evaluó mediante un diseño longitudinal de investigación. La muestra se compone de estudiantes de ‘diseño de producto industrial’ que participaron en un taller de formación sobre innovación por un período de 6 días (Capítulo 2) y 7 días (Capítulo 3), respectivamente. El capítulo 2 se basa en la teoría de la autodeterminación (Gagne & Deci, 2005) y encuentra en primer lugar evidencia del efecto mediador de la motivación intrínseca en la relación entre la satisfacción de las necesidades básicas y el comportamiento innovador laboral. Además, los resultados muestran que la relación longitudinal entre la satisfacción de las necesidades y el comportamiento innovador, es más bien bi-direccional que unidireccional, ya que un mayor nivel de comportamiento innovador en el trabajo a su vez conduce a un mayor grado de satisfacción de las necesidades básicas en el día siguiente. Sin embargo, este efecto beneficioso no se vuelve a encontrar en todos los días, lo que sugiere que el comportamiento innovador
El capítulo 3 surge como consecuencia de los resultados anteriores, y analiza las condiciones que pueden influenciar el efecto del comportamiento laboral innovador en las necesidades básicas. Más específicamente, en este estudio se investigó si ‘las percepciones de éxito’ y el ‘apoyo a la innovación’ moderan la relación entre el comportamiento innovador laboral y la posterior satisfacción. Los resultados apoyan la hipótesis de moderación planteada, puesto que el comportamiento innovador en el trabajo sólo se relaciona positivamente con los niveles más altos de satisfacción (medidos en el día siguiente), siempre y cuando se experimente suficiente éxito y cuando el entorno social proporcione suficiente apoyo para la innovación.

En el capítulo 4 se investiga bajo qué condiciones la percepción de la auto-eficacia creativa (Tierney & Farmer, 2011) tiene un impacto positivo en dos tipos de creatividad, en particular la generación de ideas radicales e incrementales. Al igual que en los capítulos 2 y 3, se utiliza un diseño de investigación longitudinal con estudiantes de ‘diseño de producto industrial’ que se encontraban trabajando en un proyecto prototipo durante un periodo de 14 semanas (tomando medidas durante 13 semanas). Basado en la literatura, es de esperar que la auto-eficacia creativa conduzca a la creatividad radical (a través de procesos de exploración) como a la incremental (a través de los procesos operativos). Sin embargo, en este estudio se asume que la relación entre la auto-eficacia creativa y los dos tipos de creatividad está influenciada por varios factores en función de su impacto en los procesos de exploración y explotación. Los resultados indican que la relación entre la auto-eficacia creativa y la creatividad radical está moderada por la percepción de propiedad con respecto a las ideas en las que se trabaja (‘propiedad psicológica de la idea’; Baer & Brown, 2012). Por otra parte, este estudio también muestra que la relación entre la auto-eficacia creativa y la creatividad incremental está moderada por las expectativas que la gente tiene sobre el resultado de sus esfuerzos creativos (‘expectativa de resultado’; Baer, 2012).

Por último, el capítulo 5 se centra en la relación dinámica entre los procesos de motivación y la creatividad en los equipos. Basado en el modelo de
demandas y recursos laborales (Bakker & Demerouti, 2007), este estudio propone un modelo de investigación para estudiar las influencias recíprocas entre recursos sociales del equipo, el compromiso con la tarea colectiva y la creatividad del equipo a través del paso del tiempo. Para probar este modelo de investigación, se ha desarrollado un ejercicio de simulación longitudinal con tres tareas creativas diferentes. Los participantes se dividieron en equipos durante tres sesiones (una sesión por semana) para realizar una tarea creativa. Los resultados muestran que durante cada episodio (cada tarea) los recursos sociales del equipo (coordinación y cohesión) se relacionan positivamente con el compromiso con la tarea colectiva, y a su vez el compromiso con la tarea colectiva tiene una influencia positiva en la creatividad del equipo. Esta secuencia muestra cómo los equipos pueden desarrollar niveles de motivación óptimos que les permita realizar tareas que requieran creatividad. Para apoyar el modelo de reciprocidad propuesto, observamos también que un mayor grado de rendimiento de los equipos en cada tarea de creatividad siempre conduce a un mayor nivel de recursos sociales en el próximo episodio.

Las iniciativas y las intervenciones que realizan las organizaciones para estimular la innovación de sus empleados muy pocas veces consiguen sus objetivos. Esto se debe, en parte, al hecho de que la mayor parte de la atención va a la ‘chispa’ que inicialmente puede animar a los empleados a innovar, pero hay pocos esfuerzos dirigidos a ayudar a desarrollar su motivación a largo plazo. Esta tesis doctoral contribuye entre otras cosas a una mejor comprensión de cómo se establece la motivación de alta calidad para proporcionar logros creativos e innovadores y cómo los individuos y los equipos pueden mantener y mejorar su motivación en el tiempo.
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