It's Time for Change:

Toward a Dynamic Perspective on Motivational and Cognitive Processes in Entrepreneurship

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Abstract

Research on motivational and cognitive processes in entrepreneurship has commonly relied on a static approach, investigating entrepreneurs' motivation and cognition at only one point in time. However, entrepreneurs' motivation and cognition are dynamic processes that considerably change over time. The goal of this dissertation is thus to adopt a dynamic perspective on motivational and cognitive processes in entrepreneurship. In three different chapters, I examine dynamic changes in the level and impact of three different processes, i.e., creativity, entrepreneurial passion, and opportunity identification. In Chapter 2, I develop a theoretical model on the alternating role of creativity in the course of the entrepreneurial process. The model emphasizes that the effects of two components underlying creativity, i.e., divergent and convergent thinking, considerably change both in magnitude and in direction throughout the entrepreneurial process. In Chapter 3, I establish and empirically test a theoretical model on entrepreneurial passion. The theoretical analysis and empirical results show that the relationships between feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success are dynamic and reciprocal rather than static and unidirectional. In Chapter 4, I develop and test a theoretical model on the effect of entrepreneurship training on opportunity identification over time. The theoretical and empirical investigation indicates that entrepreneurship training effects systematically decay over time and that action planning and entrepreneurial action sustain the effects in the long term. Altogether, the research reported in this dissertation provides novel insights into entrepreneurs' motivation and cognition which more static approaches would have obscured. Moreover, the theoretical and empirical results of each chapter resolve apparent contradictions in past research and integrate hitherto fragmented theoretical perspectives into more inclusive theoretical frameworks. Thereby, this dissertation represents an important step toward a more integrated understanding of motivational and cognitive mechanisms underlying successful entrepreneurship.

Zusammenfassung

Forschung zu motivationalen und kognitiven Prozessen im Unternehmertum verfolgt gewöhnlich einen statischen Ansatz, in dem die Motivation und Kognition von Unternehmern zu nur einem Zeitpunkt untersucht wird. Die Motivation und Kognition von Unternehmern stellen jedoch dynamische Prozesse dar, die sich über die Zeit wesentlich verändern. Das Ziel der vorliegenden Dissertation besteht daher darin, eine dynamische Perspektive auf motivationale und kognitive Prozesse im Unternehmertum einzunehmen. In drei verschiedenen Kapiteln untersuche ich dynamische Veränderungen in dem Ausmaß und in der Auswirkung von drei verschiedenen Prozessen, nämlich von Kreativität, von unternehmerischer Leidenschaft und von der Identifikation von Geschäftsgelegenheiten. In Kapitel 2 entwickle ich ein theoretisches Modell über die wechselnde Rolle von Kreativität im Laufe des unternehmerischen Prozesses. Das Modell hebt hervor, dass sich die Effekte von zwei der Kreativität zugrundeliegenden Komponenten, d.h. von divergentem und konvergentem Denken, im Laufe des unternehmerischen Prozesses sowohl in der Stärke als auch in der Richtung verändern. In Kapitel 3 entwickle und teste ich ein theoretisches Modell zu unternehmerischer Leidenschaft. Die theoretische Analyse und die empirischen Ergebnisse zeigen, dass die Zusammenhänge zwischen Gefühlen der unternehmerischen Leidenschaft, unternehmerischer Selbstwirksamkeit und unternehmerischem Erfolg eher dynamisch und reziprok als statisch und unidirektional sind. In Kapitel 4 entwickle und teste ich ein theoretisches Modell über den Effekt von Unternehmertum-Training auf die Identifikation von Geschäftsgelegenheiten über die Zeit. Die theoretische und empirische Untersuchung indiziert, dass die Effekte von Unternehmertum-Training über die Zeit systematisch zurückgehen und dass Handlungsplanung sowie unternehmerische Handlung die Effekte langfristig aufrechterhalten. Insgesamt liefert die in der vorliegenden Dissertation berichtete Forschung neuartige Einblicke in die Motivation und Kognition von Unternehmern, welche durch statische Ansätze verschleiert worden wären. Ferner lösen die theoretischen und empirischen Ergebnisse jedes Kapitels scheinbare Widersprüche in der bisherigen Forschung und integrieren bisher fragmentierte theoretische Perspektiven in integrativere theoretische Modelle. Damit stellt die vorliegende Dissertation einen entscheidenden Schritt in Richtung eines integrativeren Verständnisses von motivationalen und kognitiven Mechanismen, welche erfolgreichem Unternehmertum zugrunde liegen, dar.

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1. General Introduction

Entrepreneurship is a key driver of economic growth and wealth creation (Acs, Desai, & Hessels, 2008; Reynolds, Storey, & Westhead, 1994; van Stel, Carree, & Thurik, 2005). Research has shown that entrepreneurial firms have a substantial impact on a country's economy, e.g., by creating new jobs, furthering market competition, and pushing high-quality innovations to market (Carree & Thurik, 2003, 2008; Gries & Naudé, 2010; Reynolds, 2012; Thurik, Carree, van Stel, & Audretsch, 2008; van Praag & Versloot, 2007). Accordingly, entrepreneurial firms have been assigned an important role in shaping our economic present and future (Bruton, Ahlstrom, & Obloj, 2008).

Given the important role of entrepreneurship, a key research task is to uncover the mechanisms that underlie successful entrepreneurship (Busenitz et al., 2003; Hisrich, Langan-Fox, & Grant, 2007; Shane & Venkataraman, 2000; Shane, 2003; Venkataraman, 1997). Entrepreneurship is defined as the process of exploring and exploiting business opportunities to bring novel products and services into the marketplace (Shane & Venkataraman, 2000; Venkataraman, 1997). Successfully exploring and exploiting business opportunities requires, amongst others, entrepreneurs' motivation and cognition (Amabile, 1997; Baron, 1998; Baum, Frese, Baron, & Katz, 2007; Frese, 2009; McMullen & Shepherd, 2006; R. K. Mitchell et al., 2002; Shane, Locke, & Collins, 2003; Ward, 2004). Accordingly, scholars have devoted considerable attention to motivational and cognitive processes to better understand the mechanisms underlying successful entrepreneurship (e.g., Baron, 1998; Baron & Tang, 2011; Cardon, Wincent, Singh, & Drnovsek, 2009; Gielnik, Frese, Graf, & Kampschulte, 2012; Gielnik, Krämer, Kappel, & Frese, 2014; Hansen, Lumpkin, & Hills, 2011; Heinonen, Hytti, & Stenholm, 2011; R. K. Mitchell et al., 2002, 2007; Murnieks, Mosakowski, & Cardon, 2011).

Research on entrepreneurs' motivation and cognition has provided important insights into motivational and cognitive factors explaining an entrepreneur's success (e.g., Baron & Tang, 2011; Cardon & Kirk, 2015; Gielnik, Frese, et al., 2012; Murnieks et al., 2011; Murnieks, Mosakowski, & Cardon, 2014). Yet, such research has mainly relied on a static approach, investigating entrepreneurs' motivation and cognition at only one – often arbitrarily chosen – point in time (Baron, 2007; Chandler & Lyon, 2001; Gilbert, McDougall, & Audretsch, 2006; Mcmullen & Dimov, 2013). However, people's motivation and cognition are dynamic processes that considerably change over time (Dalal & Hulin, 2008; Lord,

Diefendorff, Schmidt, & Hall, 2010; Sonnentag & Frese, 2009). This should be especially true for entrepreneurs, given that entrepreneurship is a continuous process requiring and producing different motivations and cognitions over time (Baron, 2007; Mcmullen & Dimov, 2013). As such, the static snapshots generated by past research provide a rather simplified and often inaccurate view of the dynamic processes underlying entrepreneurs' motivation and cognition (Baron, 2007; Dalal & Hulin, 2008; Gilbert, 2014; Lord et al., 2010). Instead, research needs to adopt a more dynamic view on motivational and cognitive processes in entrepreneurship and examine how the level and the impact of these processes vary over time (Baron, 2007; Mcmullen & Dimov, 2013). While theoretical research has increasingly recognized the need of such a dynamic view on entrepreneurs' motivation and cognition, empirical research is still lagging behind (Mcmullen & Dimov, 2013). The goal of this dissertation is thus to adopt a more dynamic perspective on motivational and cognitive processes in entrepreneurship which have commonly been examined in a rather static way. Specifically, I will examine dynamic changes in the level and the impact of three different processes, i.e., creativity, feelings of entrepreneurial passion, and opportunity identification. By taking dynamic changes in these processes into account, I aim to provide a better theoretical understanding of the motivational and cognitive mechanisms underlying successful entrepreneurship.

1.1 The Role of Temporal Dynamics in Entrepreneurship

"Dynamics is at the core of entrepreneurship" (Lichtenstein, Dooley, & Lumpkin, 2006, p. 155). It is increasingly recognized that temporal dynamics are inherent in entrepreneurship, given that entrepreneurship represents a process rather than a one-time event (e.g., Mcmullen & Dimov, 2013). In fact, entrepreneurship is a continuous and dynamic process that evolves over long periods of time (Baron, 2007; Gartner, 1985; Mcmullen & Dimov, 2013; Shane & Venkataraman, 2000). The entrepreneurial process moves through different stages that are characterized by fundamentally different challenges and tasks (Baron, 2007). Moreover, entrepreneurs' challenges and tasks alternate rapidly within each stage of the entrepreneurial process (Baron, 2007; Frese, 2009; Gartner, 1989; Reynolds & White, 1997; Smilor, 1997). As such, entrepreneurs are confronted with constantly changing demands throughout the entrepreneurial process (Baron, 2007; Frese, 2009).

The dynamic and ever-changing nature of the entrepreneurial process points toward several aspects of temporality that need to be considered to adequately represent and fully understand the mechanisms underlying entrepreneurship (e.g., Aldrich, 1999; Baron, 2007; Jack & Anderson, 2002; Mcmullen & Dimov, 2013; Shane, 2003). First, given that different stages of the entrepreneurial process entail different challenges and tasks, entrepreneurs may need to engage in substantially different motivational and cognitive processes throughout the entrepreneurial process (Baron, 2007). For example, while early stages of the entrepreneurial process may mainly require cognitive processes that stimulate novel and original ideas, later stages may instead call for cognitive processes that help integrating the diverse ideas into a feasible and profitable solution (Baron, 2007). This implies that the relative importance of specific motivational and cognitive processes changes considerably over the course of the entrepreneurial process (Baron, 2002, 2007; Shane, 2003). Thus, to fully understand the role of entrepreneurs' motivation and cognition, research needs to adopt a more dynamic perspective and investigate how the impact of specific motivations and cognitions shifts over time (e.g., Aldrich, 1999; Baron, 2007; Jack & Anderson, 2002; Mcmullen & Dimov, 2013; Shane, 2003).

Second, the constant confrontation with obstacles, setbacks, or even failures may lead to substantial changes in entrepreneurs' motivation, such as entrepreneurial passion and entrepreneurial self-efficacy, over time. Smilor (1997) describes the entrepreneurial process as a bumpy roller coaster ride leading through permanent ups and downs in entrepreneurs' motivation over time. Indeed, empirical research has confirmed that entrepreneurs' motivation fluctuates considerably over short periods of time (e.g., Bledow, Schmitt, Frese, & Kühnel, 2011; Gielnik, Spitzmuller, Schmitt, Klemann, & Frese, 2015). For instance, using a repeated measures study over eight weeks, Gielnik, Spitzmuller et al. (2015) recently showed that 52 percent of the total variance in entrepreneurial passion was within-person variance. Therefore, static snapshots of entrepreneurs' motivation provide incomplete and probably misleading representations of motivational mechanisms underlying entrepreneurship (Mcmullen & Dimov, 2013). Instead, research needs to systematically investigate how these mechanisms unfold and change over time. Moreover, research should examine how these dynamic changes in entrepreneurs' motivation predict and are predicted by other motivational, cognitive, and behavioral factors. Such a dynamic investigation is important to

fully understand the roles and interrelations of entrepreneurs' motivation and surrounding factors in entrepreneurship (Gilbert, 2014; Mcmullen & Dimov, 2013).

Third, research needs to examine the maintenance of entrepreneurs' motivation and cognition over time (e.g., Gielnik, Uy, Funken, & Bischoff, 2017). As outlined above, entrepreneurs' motivational and cognitive engagement tend to rise and fall throughout the entrepreneurial process (e.g., Bledow et al., 2011; Mcmullen & Dimov, 2013; Smilor, 1997). However, entrepreneurs need to maintain continuously high levels of motivation and cognitive performance in order to successfully start and run their own business (Carter, Gartner, & Reynolds, 1996; Gartner, 1985; Reynolds & Curtin, 2008). Accordingly, an important theoretical question is whether, how, and on what conditions entrepreneurs' motivations and cognitions are maintained over time.

In sum, there are three important theoretical questions related to temporal dynamics in entrepreneurship that are to be addressed in theoretical and empirical research:

(1) How does the role of entrepreneurs' motivational and cognitive processes change throughout the entrepreneurial process?
(2) How do entrepreneurs' motivational processes change over time and how are these changes related to surrounding factors in entrepreneurship?
(3) How and on what conditions are entrepreneurs' motivational and cognitive processes maintained over time?

While scholars have increasingly recognized the significance of such theoretical questions (e.g., Baron, 2007; Gielnik, Spitzmuller, et al., 2015; Mcmullen & Dimov, 2013), empirical research has left these questions largely unexplored (Baron, 2007; Mcmullen & Dimov, 2013). The objective of this dissertation is hence to theoretically and empirically address these questions in three different fields of entrepreneurship research. Specifically, I develop and test theoretical models that consider dynamic changes in entrepreneurs' creativity, feelings of entrepreneurial passion, and opportunity identification over time. First, I develop a theoretical model on the changing role of creativity in the course of the entrepreneurial process. Second, I establish and empirically test a theoretical model on the dynamic relationships between feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success over time. Finally, I develop and analyze a theoretical model on the maintenance of opportunity identification after entrepreneurship training.

With these three pieces of research, I aim at contributing to the entrepreneurship literature in three ways. First, by approaching entrepreneurs' motivation and cognition from a dynamic perspective, I strive to provide a richer theoretical understanding of motivational and cognitive processes that underlie successful entrepreneurship. Scholars have argued that considering temporal dynamics in organizational and entrepreneurial phenomena generally allows developing more accurate and precise theories (Ancona, Goodman, Lawrence, & Tushman, 2001; Dalal & Hulin, 2008; J. M. George & Jones, 2000; Gielnik, Barabas, et al., 2014; Mcmullen & Dimov, 2013; T. R. Mitchell & James, 2001; Zaheer, Albert, & Zaheer, 1999). For instance, research on dynamic changes in entrepreneurs' motivation and cognition may provide novel insights into the existence, magnitude, and direction of causal effects which a more static approach would have obscured (Lord et al., 2010; Mcmullen & Dimov, 2013). Second, by adopting a more dynamic view on entrepreneurs' motivation and cognition, I aim at resolving existing controversies and puzzles that have been created by past research. In fact, research on performance dynamics is considered crucial to reconcile inconsistent and even contradictory results, and to integrate hitherto fragmented theoretical frameworks into more inclusive theories (Baron, 2007; Dalal & Hulin, 2008; J. M. George & Jones, 2000; Lord et al., 2010). Finally, the investigation of dynamic changes in entrepreneurs' motivation and cognition may inform future empirical research about when to measure motivational and cognitive processes to accurately depict their roles and interrelations. By illustrating when and how motivational and cognitive processes change over time, the three research papers reported in this dissertation may contribute to a more systematic design of empirical studies with regard to the number of and intervals between measurement waves (Dalal & Hulin, 2008).

1.2 The Scope and Structure of the Dissertation

In this dissertation, I examine entrepreneurs' motivation and cognition from a dynamic point of view. Specifically, in three different chapters, I uncover the temporal dynamics in entrepreneurs' creativity, feelings of entrepreneurial passion, and opportunity identification over time. In Chapter 2, we[1] develop a theoretical model on the dynamic role of creativity in the course of the entrepreneurial process. Creativity is considered as a key predictor of

[1] I use the term „we" in the following three chapters (Chapter 2, 3, and 4) because several colleagues and co-authors contributed to each chapter.

entrepreneurial success (e.g., Tsai, 2014; Ward, 2004). However, empirical research on creativity in entrepreneurship has yielded inconsistent results (Gielnik, 2013). Whereas some studies showed a positive effect of creativity on entrepreneurs' success (e.g., Baron & Tang, 2011; DeTienne & Chandler, 2004; Shane & Nicolaou, 2015), others generated non-significant results (e.g., Hansen et al., 2011; Heinonen et al., 2011; Heunks, 1998). We propose that the contradictory results arise from the relatively basic and static approach of past research investigating the effect of creativity on entrepreneurship at one – often arbitrary chosen – point in time (Dimov, 2007). We go beyond the common static approach and provide a more dynamic examination of the alternating role of creativity throughout the entrepreneurial process. Specifically, we propose an integrated theoretical model on the specific effects of two components of creativity, i.e., divergent and convergent thinking, on different outcomes along the entrepreneurial process. Our theoretical model emphasizes that the magnitude and even direction of the effects of divergent and convergent thinking considerably change throughout the entrepreneurial process. As such, our model resolves apparent contradictions in past research and provides insights into positive and negative effects which a more static approach would have obscured (see Lord et al., 2010; Mcmullen & Dimov, 2013; T. R. Mitchell & James, 2001). In sum, by taking a more dynamic perspective on creativity in entrepreneurship, this chapter provides a richer and more accurate theoretical understanding of the role of creativity in the entrepreneurial process (Baron, 2007; Gielnik, 2013; Gielnik, Frese, et al., 2012; Zhou, 2008).

In Chapter 3, we develop and empirically test a theoretical model on the reciprocal relationships between feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success. Scholars agree that entrepreneurs' passion is positively related to their entrepreneurial self-efficacy and success. However, much disagreement remains on the causal direction of these relationships. Whereas some studies describe entrepreneurial passion as predictor of entrepreneurial self-efficacy and success (e.g., Baum, Locke, & Smith, 2001; Baum & Locke, 2004; Cardon, Gregoire, Stevens, & Patel, 2013; Cardon et al., 2009; Murnieks et al., 2011, 2014; Shane et al., 2003), others view entrepreneurs' passion as outcome of their entrepreneurial self-efficacy and success (Cardon & Kirk, 2015; Collewaert, Anseel, Crommelinck, De Beuckelaer, & Vermeire, 2016; Dalborg & Wincent, 2014; Gielnik, Spitzmuller, et al., 2015). We reconcile these apparently conflicting theoretical perspectives by adopting a more dynamic view on entrepreneurial passion and its

relationships with entrepreneurial self-efficacy and success. Specifically, we develop a theoretical model positing that the relationships between feelings of entrepreneurial passion, self-efficacy, and success are dynamic and reciprocal rather than static and unidirectional. We test our theoretical model using two longitudinal field studies with weekly measurements over 12 and three weeks, respectively. The cross-lagged design of both studies allows us to investigate changes in feelings of entrepreneurial passion over time, and how these changes are affected by entrepreneurs' self-efficacy and success. The study design also enables us to examine how feelings of entrepreneurial passion predict changes in entrepreneurial self-efficacy and success. Thereby, our studies provide a rigorous test of the directionality and reciprocity of effects (Finkel, 1995; Lian, Ferris, Morrison, & Brown, 2014; Lord et al., 2010). Our findings provide empirical evidence for our theoretical model. Specifically, our results reveal a dynamic and reciprocal causative relationship between feelings of entrepreneurial passion and entrepreneurial success over time, with entrepreneurial self-efficacy mediating the reciprocal effects in both directions. We further find that entrepreneurial identity reinforces the effect of feelings of entrepreneurial passion on entrepreneurial success and that entrepreneurial self-efficacy mediates the moderation effect. As such, our research shows that the relationships between entrepreneurs' feelings of passion, self-efficacy and success are dynamic and reciprocal rather than static and unidirectional – a finding which has long been obscured by more static approaches (see Ancona et al., 2001; Dalal & Hulin, 2008; Lindsley, Brass, & Thomas, 1995; Sonnentag & Frese, 2009). Our dynamic perspective on feelings of entrepreneurial passion helps us to reconcile apparently conflicting theoretical perspectives on passion in entrepreneurship and to provide a more comprehensive picture of the links between entrepreneurial passion, self-efficacy, and success.

In Chapter 4, we develop and test a theoretical model on the effect of entrepreneurship training on opportunity identification over time. Past research on entrepreneurship training has mainly taken a static perspective on training effects, neglecting whether, how, and on what conditions training effects change over time (Gielnik et al., 2017; Lorz, Mueller, & Volery, 2013). We go beyond this common static approach and propose a theoretical model explaining how and on what conditions the effect of entrepreneurship training on opportunity identification is maintained over time. Our theoretical model posits that the effect of entrepreneurship training on opportunity identification systematically decays over time.

Moreover, we propose that the general decline in opportunity identification is prevented by participants' action planning and entrepreneurial action. We provide evidence for our model using a randomized controlled field experiment with a longitudinal pretest-posttest design and three measurement waves over 15 months. The design of our study allows us to examine the maintenance of training effects over time. Our results indicate that positive effects of entrepreneurship training tend to quickly die away like a straw fire and that action planning and entrepreneurial action sustain the effects in the long term. As such, our findings reveal that taking dynamic changes in training outcomes into account is important to fully understand how and on what conditions entrepreneurship training exerts long-term effects (Baldwin, Ford, & Blume, 2017; Gielnik et al., 2017; J. L. Huang, Ford, & Ryan, 2016; Lorz et al., 2013; Sitzmann & Weinhardt, 2017; Walton, 2014).

In Chapter 5, I conclude with a general discussion of the three pieces of research reported in this dissertation. I first summarize the key results and contributions of this research. I then discuss important theoretical and practical implications of this dissertation. The dissertation reveals that taking temporal dynamics in entrepreneurs' motivation and cognition into account is important to develop a better theoretical understanding of the mechanisms underlying successful entrepreneurship.

2. Creativity and Entrepreneurship: A Process Perspective[2]

2.1 Introduction

Creativity is widely acknowledged as a key predictor of entrepreneurship (e.g., Manimala, 2009; Shalley & Perry-Smith, 2008; Tsai, 2014; Ward, 2004; Zhou, 2008). Indeed, there are numerous theoretical reasons to expect a positive effect of creativity on entrepreneurs' success, such as creativity promoting entrepreneurs' ability to identify business opportunities and to overcome problems in the process of setting-up and managing a new venture (e.g., Hansen et al., 2011; Mcmullan & Kenworthy, 2015; Schumpeter, 1934; Ward, 2004; Zhou, 2008). However, there is surprisingly little empirical research on the effect of creativity on entrepreneurship with some of the studies yielding non-significant results (Heinonen et al., 2011; Heunks, 1998). In this chapter, we review the literature on creativity and entrepreneurship, which has generally employed a relatively basic approach to the main effects of creativity on entrepreneurship. We go beyond this relatively basic approach by adopting a more differentiated perspective on the role of creativity in entrepreneurship. Specifically, we argue that both creativity and entrepreneurship comprise different components and phases, and that these need to be taken into account in order to fully understand the effect of creativity in entrepreneurship (Dimov, 2007; Gielnik, Frese, et al., 2012; Zhou, 2008). Creativity consists of two disparate cognitive abilities, i.e., divergent and convergent thinking, which are both required to generate new and useful ideas (Basadur, Graen, & Green, 1982; Brophy, 1998; Cropley, 2006; Guilford, 1950; Ward, Smith, & Finke, 1999). Divergent thinking represents people's ability to recognize links between seemingly unrelated pieces of information and to come up with unexpected combinations of such information, leading to the generation of multiple new and original ideas (Cropley, 2006; Mumford, Mobley, Reiter-Palmon, Uhlman, & Doares, 1991). Convergent thinking, in contrast, refers to a more analytical mode of thinking that focuses on a narrow range of familiar information in order to detect one single conventional solution (Cropley, 2006; Hennessey & Amabile, 2010; Mumford et al., 1991). Similarly, entrepreneurship represents a continuous process of exploring and exploiting business opportunities (Shane &

[2] This chapter is in press and will be published as follows: Lex, M., & Gielnik, M. M. (2017). Creativity and entrepreneurship: A process perspective. In G. Ahmetoglu, T. Chamorro-Premuzic, B. Klinger, & T. Karcisky (Eds.), *The Wiley handbook of entrepreneurship*. Chichester, England: John Wiley & Sons.

Venkataraman, 2000). This entrepreneurial process can be broken down into three phases: the prelaunch phase in which entrepreneurs identify opportunities; the launch phase in which entrepreneurs set up a new venture; and the postlaunch phase in which entrepreneurs manage continuous innovation, growth, and survival of the new venture (Baron, 2007; Frese & Gielnik, 2014). Building on the assumptions that creativity and entrepreneurship encompass different components and phases, we develop a comprehensive theoretical model on the role of creativity in the entrepreneurial process. We build our cumulative process model on ambidexterity theory (Bledow, Frese, Anderson, Erez, & Farr, 2009) which provides a differentiated perspective on the generation and implementation of novel and useful ideas. Our cumulative process model integrates past theoretical and empirical research into a holistic framework and illuminates both the positive and negative effects of creativity in different phases of the entrepreneurial process.

2.2 Creativity and Entrepreneurship: A Conceptual Differentiation

Creativity and entrepreneurship are frequently viewed as inherently linked (Fillis & Rentschler, 2010; Manimala, 2009; Matthews, 2010; Sternberg & Lubart, 1999; Whiting, 1988) and have sometimes even been treated synonymously in past research (Hamidi, Wennberg, & Berglund, 2008). Indeed, there are certain parallels between creativity and entrepreneurship (Fillis & Rentschler, 2010; Shalley, Hitt, & Zhou, 2015; Ward, 2004).

Creativity is defined as the generation of new and useful ideas concerning products, services, processes, or procedures (Amabile, 1988; Anderson, Potocnik, & Zhou, 2014; Zhou & George, 2001). Similarly, entrepreneurship refers to the exploration and exploitation of business opportunities (Shane & Venkataraman, 2000), i.e., situations in which novel products and services can be introduced to the market and are considered useful by potential customers (Eckhardt & Shane, 2003). These definitions reveal that the concepts of creativity and entrepreneurship are substantially related since both address the novelty and usefulness of an idea or product (Gielnik, 2013; Matthews, 2007; Ward, 2004). However, there are also important conceptual differences between the two constructs that need to be taken into account when investigating the effect of creativity in entrepreneurship (Dino, 2015). Entrepreneurship goes beyond creativity because it does not only comprise the generation of novel and useful ideas but also the refinement and implementation of these ideas into a viable business opportunity (Dimov, 2007; Gielnik, 2013; M. S. Wood & McKinley, 2010). More

specifically, entrepreneurship represents a continuous process that starts with the generation of an idea which then needs to be elaborated, refined, and implemented with the help of entrepreneurial actions (Dimov, 2007). Important entrepreneurial actions include, for example, collecting information and feedback regarding the feasibility of the idea and advancing the initial idea based on the acquired information (Lumpkin & Lichtenstein, 2005; Ravasi & Turati, 2005). Also, entrepreneurs have to invest considerable effort to acquire financial resources and to attract high-quality employees that enable the implementation of the business opportunity (Baron, 2007; Ward, 2004). All these entrepreneurial activities require creativity (Mcmullan & Kenworthy, 2015; Shalley & Perry-Smith, 2008; Zhou, 2008). As such, creativity is not a synonym for entrepreneurship but rather a key factor that is essential in the entire entrepreneurial process to successfully explore and exploit business opportunities (Zhou, 2008).

2.3 The Effect of Creativity on Entrepreneurship

Scholars agree that creativity plays a key role in entrepreneurship (e.g., Dayan, Zacca, & Di Benedetto, 2013; Shalley & Perry-Smith, 2008; Tsai, 2014; Ward, 2004; Zhou, 2008). For instance, scholars have described creativity as the "spirit of entrepreneurship" (Tsai, 2014, p. 106) or as "the most critical trait of an entrepreneur" (Manimala, 2009, p. 121). While there is theoretical agreement that creativity positively affects an entrepreneur's success, empirical research on the role of creativity in entrepreneurship has provided inconsistent results (Gielnik, 2013). In the following, we review empirical research examining the link between creativity and entrepreneurship. An overview of empirical research on the link between creativity and entrepreneurship is provided in Table 2.1.

Table 2.1

Empirical Results on the Role of Creativity for Entrepreneurial Success in the Three Phases of the Entrepreneurial Process

Phase	Prelaunch	Launch	Postlaunch
Positive effects	DeTienne & Chandler (2004): Creativity training → Business opportunity identification	Audretsch & Belitski (2013); Lee, Florida, & Acs (2004): Regional creativity → Business creation	Baron & Tang (2011): Creativity → Radicalness of implemented innovations
	Hansen, Lumpkin, & Hills (2011): Creativity → Business opportunity identification (in part)	Knörr, Alvarez, & Urbano (2013): Creativity → Probability of becoming an entrepreneur	Morris & Fargher (1974) Creativity → Venture growth
	Shane & Nicolaou (2015): Creative personality → Business opportunity identification	Shane & Nicolaou (2015): Creative personality → Business creation	
No effects	Antonio, Lanawati, Wiriana, & Christina (2014): Creativity ↛ Achievements in entrepreneurship education	Hull, Bosley, & Udell (1980): Creativity ↛ Business creation	Heunks (1998): Creativity ↛ Venture profit and growth
	Hansen, Lumpkin, & Hills (2011): Creativity ↛ Business opportunity identification (in part)		
	Heinonen, Hytti, & Stenholm (2011): Creativity ↛ Viability of generated business ideas		

On the one hand, there is indeed some empirical research indicating a positive effect of creativity in all phases of the entrepreneurial process (see Table 2.1). For example, focusing on the prelaunch phase, DeTienne and Chandler (2004) provided empirical evidence for a positive effect of creativity on business opportunity identification. Using an experimental pretest-posttest control group design, the authors showed that participating in creativity

training increases the number and innovativeness of identified business opportunities. Recently, Shane and Nicolaou (2015) substantiated these results by showing that people with creative personalities are more likely than others to identify business opportunities. Furthermore, research investigating the role of creativity in the launch phase has provided evidence that creativity also promotes actual business creation (e.g., Audretsch & Belitski, 2013; Lee, Florida, & Acs, 2004; Shane & Nicolaou, 2015). For example, the study by Shane and Nicolaou (2015) revealed that having a creative personality does not only increase people's opportunity identification but also their tendency to start a business. Moreover, using a county-level study covering the entire United States, Lee et al. (2004) found a positive and significant impact of a county's creativity level on its rate of business creation. Similarly, Audretsch and Belitski (2013) showed a positive effect of regional creativity on the number of businesses being started across 143 European cities. Supporting these regional-level results, Knörr, Alvarez, and Urbano (2013) showed in a study on the individual level that an individual's creativity raises the likelihood of becoming an entrepreneur. Furthermore, studies examining creativity in the postlaunch phase have provided evidence that creativity also fosters entrepreneurs' success after having started a business (Baron & Tang, 2011; Morris & Fargher, 1974). For instance, based on a sample of 99 entrepreneurs in the United States, Baron and Tang (2011) theorized and showed a positive effect of entrepreneurs' creativity on the radicalness of innovations implemented in their new ventures. Radicalness of innovations is an important predictor of new venture performance (Rosenbusch, Brinckmann, & Bausch, 2011; Tushman & Anderson, 1986; Zahra & Bogner, 2000). In line with these results, Morris and Fargher (1974) demonstrated that entrepreneurs' creativity is positively related to the growth of their new ventures. These studies highlight the important role of entrepreneurs' creativity for their venture performance.

In contrast to the studies showing a positive impact of creativity in entrepreneurship, other studies have failed to demonstrate such an effect for the respective phases of the entrepreneurial process (see Table 2.1). Focusing on the prelaunch phase, Antonio, Lanawati, Wiriana, and Christina (2014) conducted a cross-sectional study with 283 university graduates and reported that individuals' creativity did not predict their achievements in entrepreneurship education. Furthermore, Hansen, Lumpkin, and Hills (2011) found only partial support for a link between entrepreneurs' creativity and their ability to recognize opportunities. While creativity was positively and significantly related to two activities

underlying opportunity recognition, creativity did not affect three further important activities required for opportunity recognition (Hansen et al., 2011). Heinonen et al. (2011) also yielded non-significant results indicating that students' creativity did not have a direct effect on the viability of business ideas generated during an entrepreneurship course. Similarly, with regard to the launch phase, Hull, Bosley, and Udell (1980) failed to establish a link between creativity and business creation. Using a survey study with 307 university graduates, the authors showed that individuals' creativity did not distinguish between entrepreneurs and non-entrepreneurs. Regarding the postlaunch phase, a study with 200 entrepreneurs across six countries revealed that entrepreneurs' creativity did not influence the profit and growth of their ventures (Heunks, 1998). Taken together, these studies cast some doubt that creativity directly affects success in entrepreneurship.

In sum, empirical research on the role of creativity in entrepreneurship has yielded inconsistent results which, at least in part, directly contradict each other. The contradictory results may result from the relatively basic approach adopted by past research (Dimov, 2007). Past research has mainly examined the link between creativity and entrepreneurship using relatively broad measures of creativity and entrepreneurship. Both creativity and entrepreneurship, however, are complex processes comprising multiple components and phases over time (Dimov, 2007; Gielnik, Frese, et al., 2012; Nyström, 1993; Zhou, 2008). Accordingly, to fully understand the role of creativity in entrepreneurship, research needs to adopt a more differentiated perspective by distinguishing between different components of creativity and entrepreneurship (Baron, 2007; Gielnik, 2013; Gielnik, Frese, et al., 2012; Zhou, 2008). Numerous scholars have called for such a differentiated perspective on creativity in entrepreneurship (e.g., Baron, 2007; Zhou, 2008). We follow these calls and propose an integrated theoretical model on the role of creativity in the entrepreneurial process. Our model provides a more fine-grained investigation of the specific effects of the two components of creativity, i.e., divergent and convergent thinking, on different outcomes throughout the entrepreneurial process. Such a detailed examination helps to resolve apparent contradictions in past research and thus contributes to our understanding of the diverse effects of creativity in the different phases of the entrepreneurial process (Baron, 2007; Gielnik, Frese, et al., 2012; Zhou, 2008).

2.4 Toward a Cumulative Process Model of Creativity in Entrepreneurship

Drawing upon past research in the areas of creativity and entrepreneurship, we build our theoretical model on the following three assumptions. First, entrepreneurship is a continuous and dynamic process comprising three different phases: the prelaunch, the launch, and the postlaunch phases (Baron, 2007). Each phase requires specific ways of entrepreneurial thinking and acting (Baron, 2007). Accordingly, an entrepreneur's success in each phase encompasses different dimensions that are differentially affected by creativity (Baron, 2007; Dimov, 2007). Second, creativity consists of two components, i.e., divergent and convergent thinking (Basadur et al., 1982; Brophy, 1998; Guilford, 1950; Ward et al., 1999), which have differential effects on success in entrepreneurship. Third, creativity is of continuing importance for an entrepreneur's success throughout the entire entrepreneurial process (Lin & Nabergoj, 2014; Ogbari & Isiavwe, 2015; Shalley et al., 2015; Shalley & Perry-Smith, 2008; Zhou, 2008). More specifically, both divergent and convergent thinking are fundamental to an entrepreneur's success in each phase of the entrepreneurial process (Manimala, 2009). The relative importance and specific effects of entrepreneurs' divergent and convergent thinking, however, considerably change in the course of the entrepreneurial process (Baron, 2002, 2007; Baron & Markman, 2005; Baron & Shane, 2004; Shane, 2003). It follows from these assumptions that a differentiated perspective on creativity in entrepreneurship requires examining the specific effects of divergent and convergent thinking on different dimensions of entrepreneurial success in the three phases of entrepreneurship (e.g., Gielnik, 2013; Gielnik, Frese, et al., 2012).

Recently, scholars have started to adopt such a differentiated perspective and investigated the effects of different components of creativity on success in different phases of the entrepreneurial process. For example, several studies have examined the effect of divergent thinking on business opportunity identification. Using both a correlational field study and an experimental design, Gielnik, Frese et al. (2012) provided evidence that divergent thinking has a significant positive effect on the originality of identified business opportunities which in turn positively predicts business growth. A recent field study substantiated these results by showing a positive effect of entrepreneurs' divergent thinking on the number of identified business opportunities and the innovativeness of newly introduced products or services (Gielnik, Krämer, et al., 2014). Further support for a positive

effect of divergent thinking on business opportunity identification stems from Karimi et al. (2014) who showed that training in divergent thinking promotes participants' ability to generate multiple and innovative business ideas. Taking a step further, Ames and Runco (2005) investigated the impact of entrepreneurs' divergent thinking on actual business creation. Based on a field survey study with actual entrepreneurs, the authors demonstrated that divergent thinking has a positive effect on the number of businesses started by an entrepreneur. Beyond these studies directly examining the effect of divergent thinking on entrepreneurship, empirical evidence from other academic fields indicates further links between divergent thinking and entrepreneurial success. For instance, past research suggests that divergent thinking helps an entrepreneur to develop and communicate an effective vision (Matthew, 2009; Strange & Mumford, 2005) which in turn positively affects business growth (Baum, Locke, & Kirkpatrick, 1998). Also, divergent thinking enables entrepreneurs to generate ideas on how to overcome barriers in the entrepreneurial process, which in turn helps to persistently pursue entrepreneurial goals (Frese & Fay, 2001; Markman, Baron, & Balkin, 2005; Zaccaro, Mumford, Connelly, Marks, & Gilbert, 2000). Apart from these studies focusing on divergent thinking, there is also some empirical research suggesting a positive effect of convergent thinking on entrepreneurial success. For instance, Chen, Chang, and Lo (2015) recently provided evidence that entrepreneurs with high levels of convergent thinking display more rational and effective conflict management styles, which in turn substantially promotes new venture performance (Liu, Fu, & Liu, 2009).

While these findings provide interesting insights into the role of creativity and its two components divergent and convergent thinking in entrepreneurship, the findings remain fairly fragmented and disconnected. We therefore aim to integrate the fragmented findings into a more inclusive model on creativity in entrepreneurship. Our theoretical model illuminates how and why divergent and convergent thinking promote or hinder different indicators of entrepreneurial success in the three phases of entrepreneurship. In the following, we first present the key assumptions underlying our process model in more detail. We then propose a comprehensive process model on the role of creativity in entrepreneurship. We conclude by summarizing the central contributions of our theoretical model.

2.4.1 Key Assumptions of the Cumulative Process Model

2.4.1.1 Creativity and its Underlying Components

To systematically examine the effect of creativity on entrepreneurship, we first need to precisely conceptualize creativity. Creativity can be conceptualized as a complex cognitive process that requires the two specific cognitive abilities of divergent and convergent thinking (Basadur et al., 1982; Brophy, 1998; Cropley, 2006; Guilford, 1950; Mumford et al., 1991; Runco & Acar, 2012; Runco, 2003; Ward et al., 1999).[3] Divergent and convergent thinking represent two disparate cognitive processes leading to different outcomes. Divergent thinking refers to people's capacity to think across different dimensions of information, to make associations among apparently unrelated information, and to create novel combinations of those seemingly unrelated concepts, resulting in the generation of a broad range of new and original ideas (Cropley, 2006; Hennessey & Amabile, 2010; Mumford et al., 1991). As such, divergent thinking is generally directed at increasing variability in generated ideas (Cropley, 2006). Convergent thinking, in contrast, represents a more disciplined and analytical way of thinking that focuses on a small amount of familiar and obviously relevant information with the goal of detecting one single best answer (Cropley, 2006; Hennessey & Amabile, 2010; Mumford et al., 1991). Accordingly, convergent thinking is mainly focused on narrowing variability to one single idea or solution (Cropley, 2006; Hennessey & Amabile, 2010). Scholars have widely acknowledged that both ways of thinking are required to come up with creative, i.e., novel and useful, ideas (Brophy, 1998; Cropley, 2006; Runco, 2003). While divergent thinking allows the generation of a high number of original ideas, convergent thinking is important for evaluating and refining these ideas into not only novel but also useful ideas (Bledow et al., 2009; Cropley, 2006; Runco, 2003). As such, the effects of both divergent and convergent thinking need to be taken into account in order to fully understand the role of creativity in the entrepreneurial process.

[3] Past entrepreneurship research has conceptualized creativity in a number of different ways, e.g., as a stable personality characteristic (e.g., Heinonen et al., 2011; Heunks, 1998; Shane & Nicolaou, 2014) or as cognitive capability (e.g., Ames & Runco, 2005; Baron, 2006; Gielnik, Frese, et al., 2012; Gielnik, Krämer, et al., 2014). Given that recent creativity research primarily describes creativity as a cognitive process rather than a stable trait (e.g., Anderson et al., 2014; Brophy, 1998; Cropley, 2006), we follow this common cognitive approach and conceptualize creativity as a cognitive process rather than a stable trait.

2.4.1.2 The Entrepreneurial Process and its Constituting Phases

To fully understand the role of creativity in entrepreneurship, we further need to clearly conceptualize entrepreneurship. Entrepreneurship represents not a one-time event, but rather a continuous and dynamic process that unfolds over time (e.g., Baron, 2007; Baron & Shane, 2004; Bygrave, 1989; Shane, 2003). The entrepreneurial process is dynamic in nature, meaning that it confronts entrepreneurs with a wide range of tasks in an ever-changing and unpredictable manner (e.g., Aldrich, 1999; Baron, 2007; Baron & Shane, 2004; Gartner, 1988; Harvey & Evans, 1995; Low & Abrahamson, 1997; Phan, Zhou, & Abrahamson, 2010; Shane & Venkataraman, 2000). While entrepreneurs' tasks rapidly change throughout the entire entrepreneurial process, there are some key entrepreneurial activities that are characteristic of different stages within the entrepreneurial process (e.g., Baron, 2007; Baron & Shane, 2004; Bygrave, 1989; Shane, 2003). Accordingly, entrepreneurship can be described as a dynamic process that moves through several distinct but closely intertwined phases (e.g., Baron, 2007; Baron & Shane, 2004; Bygrave, 1989; Shane, 2003). Scholars have suggested various process models that define different phases of the entrepreneurial process (e.g., Baron, 2007; Bhave, 1994; Bygrave, 1989, 2006; Hornsby, Naffziger, Kuratko, & Montagno, 1993; Shane, 2003). One prominent process model has been proposed by Baron (2007). Baron's (2007) process model is based on prior conceptualizations of the entrepreneurial process (e.g., Shane, 2003; Venkataraman, 1997) and provides a useful framework to systematically analyze the differential effects of potential influencing factors on an entrepreneur's success (see Baron, 2007; Baron & Shane, 2004). We therefore build our theoretical model on the process model suggested by Baron (2007).

According to Baron (2007), the entrepreneurial process can be divided into three main phases: the prelaunch, the launch, and the postlaunch phases. The prelaunch phase refers to the time period prior to the actual launch of a new venture. In this phase, entrepreneurs primarily need to identify original and potentially useful business opportunities. Accordingly, entrepreneurs' success in this phase is captured by the number, originality, and usefulness of generated business opportunities (Baron, 2007; Baron & Shane, 2004). The second phase, the launch phase, comprises all entrepreneurial activities that are required for the actual launch of the new venture (Baron, 2007). Important entrepreneurial activities include, for example, acquiring a broad array of resources such as financial capital, potential partners, and high-

quality employees,[4] choosing and establishing a legal form for the new venture, as well as developing strong marketing plans and strategies for exploiting the business opportunity. Thus, meaningful measures of entrepreneurial success in this phase are the amount of resources acquired and the time that was needed to raise these resources as well as actual business creation (Baron, 2007). The third phase, the postlaunch phase, encompasses all activities that are required after the start-up period. In this phase, entrepreneurs need to build the newly established venture into a viable, continuously innovating, and growing business (Baron, 2007; Baron & Shane, 2004). Specifically, entrepreneurs need to ensure continuous innovation and growth of the new venture, for example by introducing new products, services, or processes, attracting, leading, and retaining high-quality employees, and developing strong strategies for promoting and managing growth (see Baron, 2007; Baron & Shane, 2004). Accordingly, meaningful success measures are financial measures capturing survival, continuous innovation, and growth of the new venture.

Baron's (2007) process model offers important insights into major tasks that are to be accomplished at different stages of the entrepreneurial process (Baron, 2007; Baron & Shane, 2004). However, the process model simplifies the dynamic nature of the entrepreneurial process which is not a linear sequence of phases (Baron, 2007; Baron & Shane, 2004) but cumulative in nature. Specifically, while the entrepreneurial process may indeed be composed of different phases that are characterized by specific key activities, these phases do not occur consecutively but rather simultaneously or cumulatively (Baron, 2007; Baron & Shane, 2004; Matthews, 2007). We therefore expand Baron's (2007) linear process model and emphasize that entrepreneurship is a cumulative process in which every activity of a prior phase is also required in subsequent phases of the entrepreneurial process. For instance, an entrepreneur's task to generate and evaluate business opportunities is not completed at the end of the prelaunch phase, but remains important in the launch and postlaunch phases. Indeed, to bring an initially generated and evaluated business opportunity to fruition, entrepreneurs need to continuously develop and extend the business opportunity in the launch phase (Ward, 2004). Moreover, entrepreneurs need to continually come up with new business opportunities in the postlaunch phase to ensure survival and growth of the new venture. In addition, while entrepreneurs start acquiring resources and implementing the business

[4] According to Baron (2007), the assembly of resources is mainly required in the prelaunch phase. We argue that assembling resources is an ongoing task that is primarily required when preparing the launch of the new venture. We therefore depart from Baron (2007) and allocate the task to acquire resources into the launch phase (see also Frese & Gielnik, 2014).

opportunity in the launch phase, these tasks remain crucial in the postlaunch phase as well (e.g., Baker & Nelson, 2005; Lin & Nabergoj, 2014; Tyebjee & Bruno, 1984). Consequently, the specific effects of divergent and convergent thinking are not only important in one phase – for example, the specific effects on assembling resources and actually launching the new venture in the launch phase – but also in all subsequent phases. Our cumulative process model highlights the repetitive and cumulative nature of the entrepreneurial process, meaning that all activities and tasks of one phase are proper subsets of each subsequent phase (see Figure 2.1). As such, our cumulative process model provides important insights into the major activities that dominate the entrepreneur at different stages of the entrepreneurial process while taking the cumulative nature of the entrepreneurial process into account.

2.4.1.3 An Ambidexterity Perspective on Creativity in the Entrepreneurial Process

Scholars have often acknowledged that creativity plays a crucial role throughout the entire entrepreneurial process (e.g., Lin & Nabergoj, 2014; Ogbari & Isiavwe, 2015; Shalley et al., 2015; Shalley & Perry-Smith, 2008; Zhou, 2008). The underlying assumption is that creativity is important for various entrepreneurial activities at different stages of the entrepreneurial process such as recognizing promising business opportunities before launching a new venture, assembling resources while actually launching the new venture, as well as promoting continuous innovation and growth after having launched a new venture (Mcmullan & Kenworthy, 2015; Perry-Smith & Mannucci, 2015; Shalley & Perry-Smith, 2008). We concur with this assumption and take it a step further to develop a more nuanced model of creativity in entrepreneurship. Building on our more fine-grained conceptualizations of creativity and entrepreneurship, we argue that both divergent and convergent thinking are fundamental to an entrepreneur's success in each phase of the entrepreneurial process (Manimala, 2009). Each phase of the entrepreneurial process entails tasks that require the generation of multiple novel and original ideas – i.e., divergent thinking – and tasks that call for the detection of one accurate answer – i.e., convergent thinking (see Bledow et al., 2009; Brophy, 1998; Manimala, 2009). Moreover, given the dynamic nature of the entrepreneurial process, tasks requiring divergent thinking and tasks calling for convergent thinking continuously alternate and even occur simultaneously throughout the entrepreneurial process (see Cropley, 2006; Manimala, 2009; Wolf & Mieg, 2010). However, divergent and convergent thinking represent fundamentally different and even contradictory cognitive processes that compete for entrepreneurs' scarce resources (Bledow et al., 2009; Cropley,

2006; Getzels & Jackson, 1962). Accordingly, the need of both divergent and convergent thinking confronts entrepreneurs with inconsistent and seemingly incompatible psychological demands (Bledow et al., 2009).

Bledow et al. (2009) proposed a theoretical framework that helps to explain how entrepreneurs can successfully manage these inherently conflicting demands. In their ambidexterity theory, they describe how individuals and teams can manage innately conflicting demands of innovation within organizations. We borrow from this theoretical framework and apply it to the domain of entrepreneurship.

According to Bledow et al. (2009), apparently conflicting activities, such as divergent and convergent thinking, are not necessarily incompatible but complementary. In fact, divergent and convergent thinking are tightly intertwined and mutually dependent processes that need to be combined and integrated to generate synergistic outcomes (Bledow et al., 2009; Brophy, 1998). Accordingly, entrepreneurs need to actively capitalize on the mutual dependence and use the synergies that reside in prosecuting both divergent and convergent thinking (see Bledow et al., 2009). Moreover, given that the entrepreneurial process is chaotic in nature, entrepreneurs need to flexibly alternate from one kind of thinking to the other according to situational demands (Manimala, 2009; Wolf & Mieg, 2010). Indeed, empirical research supports this assumption by showing that entrepreneurs' ability to switch between divergent and convergent thinking promotes their success in terms of the number of granted and marketed patents (Wolf & Mieg, 2010).

In sum, we propose that entrepreneurs generally need to be able to perform both divergent and convergent thinking as well as to flexibly switch between these two types of thinking according to situational demands (see Bledow et al., 2009). Moreover, given that entrepreneurs' major tasks and activities shift in the course of the entrepreneurial process, the relative importance of an entrepreneur's divergent and convergent thinking may considerably vary across the different phases of the entrepreneurial process (Baron, 2002, 2007; Baron & Markman, 2005; Baron & Shane, 2004; Shane, 2003). We thus propose a comprehensive process model that systematically analyzes the roles of divergent and convergent thinking in each phase of the entrepreneurial process separately. Moreover, given that entrepreneurs' tasks build up cumulatively along the different phases of the entrepreneurial process, our cumulative process model elucidates how the effects of divergent and convergent thinking spill over and reappear in subsequent phases of the entrepreneurial process (see Figure 2.1).

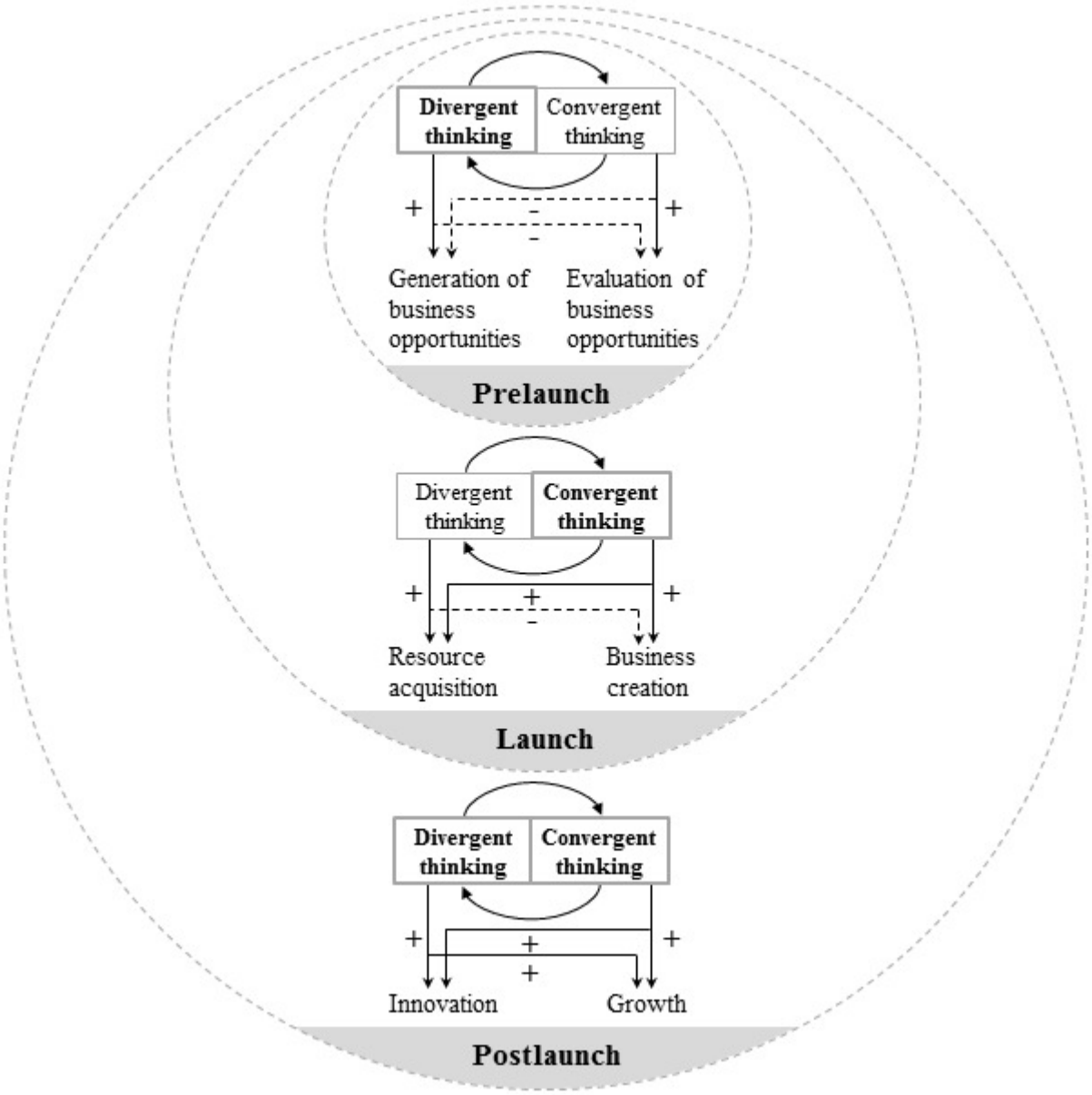


Figure 2.1. A Cumulative Process Model on the Changing Roles of Divergent and Convergent Thinking throughout the Entrepreneurial Process

2.4.2 A Cumulative Process Model on Creativity in Entrepreneurship

2.4.2.1 Prelaunch

The prelaunch phase comprises an entrepreneur's activities prior to the actual launch of a new venture (Baron, 2007). In this phase, the most important task is to identify an original and potentially useful business opportunity (Baron, 2007; Baron & Shane, 2004). The

identification of a promising business opportunity can be seen as a two-step process requiring entrepreneurs, first, to generate new business ideas and, second, to evaluate and develop these ideas into an original and feasible business opportunity (Dimov, 2007). Past research has argued that both the generation of novel business ideas and the further development of these ideas into a business opportunity largely depend on creativity (Ardichvili, Cardozo, & Ray, 2003; Baron, 2006; Dimov, 2007; Phan et al., 2010; Shane, 2003; Ward, 2004; Zhou, 2008). We concur with this assumption and take it a step further by disentangling the concept of creativity into divergent and convergent thinking. Specifically, we argue that both divergent and convergent thinking strongly, but differently, affect entrepreneurs' success throughout the opportunity identification process as outlined in the following.

First, entrepreneurs need to generate a high number of original business ideas. Coming up with a high number of business ideas is important because generating a large amount of ideas enhances the probability of identifying original ideas (Simonton, 1989). Identifying original business ideas is crucial because original ideas are likely to result in more innovative products and services that provide a stronger competitive advantage and thus positively affect new venture performance (Baron & Tang, 2011; Drucker, 1998; Gielnik, Frese, et al., 2012; Gielnik, Krämer, et al., 2014; Porter, 1980; Shepherd & DeTienne, 2005; Zahra & Bogner, 2000). Building on past research, we argue that generating a high number of original business ideas is positively affected by entrepreneurs' divergent thinking and negatively influenced by entrepreneurs' convergent thinking (see Figure 2.1). Original business ideas usually represent novel combinations of familiar ideas, routines, or information (Baron, 2007). As described above, an individual's cognitive capacity to create novel and unexpected combinations of existing concepts corresponds to divergent thinking (Cropley, 2006; Hennessey & Amabile, 2010; Mumford et al., 1991). Indeed, empirical research has provided evidence that divergent thinking positively affects the number and originality of generated business ideas (Gielnik, Frese, et al., 2012; Gielnik, Krämer, et al., 2014; Karimi et al., 2014). Convergent thinking, in contrast, represents a more analytical and systematic way of thinking that results in the detection of one correct and conventional answer rather than multiple novel ideas (Cropley, 2006; Guilford, 1967; Hennessey & Amabile, 2010; Mumford et al., 1991; Ward et al., 1999). Accordingly, convergent thinking should limit entrepreneurs' capability to come up with a high number of original business ideas and thus have a negative effect at the beginning of the opportunity identification process.

After generating multiple original business ideas, entrepreneurs need to evaluate the generated ideas, select the most promising ideas, and develop the selected idea into a viable and feasible business opportunity (Baron, 2007; Chang, Hung, & Lin, 2014; Dimov, 2007; Ward, 2004). As displayed in Figure 2.1, this process of evaluating, selecting, and refining initially generated ideas should be promoted by entrepreneurs' convergent thinking (Brophy, 1998; Cropley, 2006; Erez & Nouri, 2010; Gielnik, Frese, et al., 2012). Convergent thinking helps entrepreneurs to systematically analyze significant strengths and weaknesses of ideas and thus to evaluate the feasibility of initially generated business ideas (Cropley, 2006; Runco, 2003). Furthermore, convergent thinking facilitates focusing on a limited range of ideas and thus supports entrepreneurs in reducing the large amount of generated business ideas to one single best idea (Cropley, 2006; Nyström, 1993). Convergent thinking also enables entrepreneurs to acquire and systematically analyze information on potential competitors, industries, and markets (Cropley, 2006) which is important to evaluate and refine the selected idea into a viable business opportunity (Heinonen et al., 2011). Divergent thinking, in contrast, should negatively affect entrepreneurs' ability to evaluate, select, and refine business ideas (see Figure 2.1). The unconventional way of thinking and the tendency to increase variability that are associated with divergent thinking should counteract the evaluation and selection of a limited number of business ideas (see Cropley, 2006; Gielnik, Frese, et al., 2012).

In sum, we argue that the prelaunch phase calls for both divergent and convergent thinking (see Figure 2.1). Identifying an original and feasible business opportunity requires entrepreneurs, first, to generate multiple original business ideas using divergent thinking and, second, to evaluate and refine these ideas into one feasible business opportunity based on convergent thinking. It is important to note, however, that the tasks of generating and evaluating business ideas do not follow each other in neat sequence. Instead, opportunity identification is a dynamic and iterative process which requires entrepreneurs to generate and evaluate business ideas in continuing alternation (Dimov, 2007; Hills, Shrader, & Lumpkin, 1999; Lumpkin, Hills, & Shrader, 2004; Lumpkin & Lichtenstein, 2005). Accordingly, to identify an original and useful business opportunity, entrepreneurs need to flexibly switch between divergent and convergent thinking according to situational demands.

While both divergent and convergent thinking are considered important for opportunity identification, divergent thinking should play a major role at this stage (Gielnik, Krämer, et

al., 2014). The process of identifying an original and useful business opportunity is mainly characterized by creating novel combinations of ideas using divergent thinking rather than detecting one single best answer via convergent thinking (Eckhardt & Shane, 2003; Gielnik, Krämer, et al., 2014). However, as outlined above, solely relying on divergent thinking would result in wild business ideas which may be completely novel and original but infeasible and thus useless (Cropley, 2006; Runco & Acar, 2012). Accordingly, identifying an original and useful business opportunity requires a combination of divergent and convergent thinking with a stronger emphasis on divergent thinking. The degree of emphasis placed on divergent thinking compared to convergent thinking should then determine the originality of the identified business opportunity (see Campos, Parellada, Quintero, Alfonso, & Valenzuela, 2015; Heunks, 1998). The underlying assumption is that highly original business opportunities represent completely novel and unexpected combinations of unrelated concepts which require an especially high degree of divergent thinking to be created (Campos et al., 2015). Therefore, a strong focus on divergent thinking should lead to more original business opportunities, whereas a low focus on divergent thinking should result in more incremental business opportunities (Campos et al., 2015).

2.4.2.2 Launch

The successful identification of an original and useful business opportunity is only the first step in the entrepreneurial process (Baron, 2007). Having identified an opportunity, entrepreneurs need to devote considerable effort to the actual launch of the new venture. Launching a new venture requires entrepreneurs to mobilize a wide range of resources (Baron, 2007; Shane & Venkataraman, 2000). For instance, they have to assemble financial resources such as venture capital, social resources such as social support by relatives and friends, human resources such as potential partners and employees, and informational resources such as information about the market and potential competitors (Baron, 2007; Perry-Smith & Mannucci, 2015). Acquiring all these resources has been described as one of the most critical steps in the entrepreneurial process (Baron, 2007; Shalley et al., 2015) that largely depends on an entrepreneur's creativity (Kirzner, 2009; Lin & Nabergoj, 2014; Matthews, 2007; Shalley et al., 2015; Shane, 2012). We concur with this assumption and take it a step further, suggesting that entrepreneurs' ability to assemble resources requires both divergent and convergent thinking (see Figure 2.1).

To obtain access to resources, entrepreneurs first have to persuade potential investors, partners, and employees of the value and potential of their business opportunity which is, at that point of time, still unknown and full of risk (X.-P. Chen, Yao, & Kotha, 2009; Phan et al., 2010; Ward, 2004). Therefore, entrepreneurs need to generate original ideas about how to convince other people to invest in their risky business opportunity and how to react to concerns raised by potential investors (Adner & Levinthal, 2008; X.-P. Chen et al., 2009; Ward, 2004; Zhou, 2008). As outlined above, coming up with such original ideas calls for entrepreneurs' divergent thinking (Cropley, 2006; Hennessey & Amabile, 2010; Mumford et al., 1991). In addition, to really convince resource providers to actually invest money in the new venture, entrepreneurs also need to write and present a fully developed and highly elaborate business plan (Becherer & Helms, 2009). A business plan entails detailed information about how to set up, develop, and grow the new venture (Baron & Shane, 2004). Writing such a business plan requires entrepreneurs to seek, thoroughly evaluate, and carefully consider information about the prospective market, potential competitors, legal and financial conditions, as well as potential challenges and feasible solutions in starting and running the new venture (X.-P. Chen et al., 2009). Based on the acquired information, entrepreneurs need to carefully plan the entire set-up and growth of the new venture (X.-P. Chen et al., 2009). As described above, accumulating, evaluating, and using such information to carefully plan a new venture is facilitated by entrepreneurs' convergent thinking (Cropley, 2006).

Once entrepreneurs have acquired sufficient resources, they can actually launch the new venture (Baron, 2007; Baron & Shane, 2004). The launch of the new venture calls for various further important entrepreneurial activities and decisions such as determining the legal form of the venture, developing strong marketing plans and strategies for exploiting the business opportunity, protecting the product or service by ensuring intellectual property rights, and organizing the production and timely introduction to market (Baron, 2007; Baron & Shane, 2004). To successfully accomplish all these tasks, entrepreneurs need to systematically search for a wide array of information, thoroughly analyze the acquired information, and decide for one best option based on the information. Having decided for one single solution, it is important that entrepreneurs stick to this solution and refrain from performing divergent activities that are targeted toward other ideas or activities than the efficient execution of the chosen solution (see Bledow et al., 2009; Brophy, 1998; Delmar &

Shane, 2003; Shane & Delmar, 2004). For instance, to establish a specific legal form of the new venture, entrepreneurs need to seek information about various potential legal forms, evaluate the different possibilities with regard to the venture, decide for one single legal form that matches the requirements of the venture, and execute the legal establishment of the venture in an efficient way (Baron & Shane, 2004; Leach & Leach, 1984). Furthermore, to come up with strong marketing plans and strategies, entrepreneurs need to thoroughly analyze the new venture's external environment and define marketing concepts that are perfectly aligned to its specific needs (Zahra & Bogner, 2000). As such, launching a new venture is mainly focused on decreasing variability via convergent thinking (Cropley, 2006). Some levels of divergent thinking, however, are considered to be important to succeed in the launch of a new venture as well. When launching a new venture, entrepreneurs usually encounter various obstacles and barriers such as skeptical investors, legal restrictions, or bureaucratic procedures that hinder the legalization of the venture (Kuuluvainen, 2009; Nieman, Hough, & Nieuwenhuizen, 2003). Facing such barriers, entrepreneurs need to come up with original ideas on how to overcome these barriers using divergent thinking (Cropley, 2006). Moreover, given that these sudden barriers rapidly occur while launching a new venture, entrepreneurs need to be able to alternate from convergent thinking to divergent thinking in a dynamic and flexible manner (see Figure 2.1).

Besides assembling resources and actually launching the new venture, entrepreneurs need to invest further effort to continuously develop and improve the business opportunity which was generated in the prelaunch phase (see Figure 2.1). In the launch phase, entrepreneurs receive valuable information and feedback regarding their business opportunity from important stakeholders and people they trust (Dimov, 2007; M. S. Wood & McKinley, 2010). Successfully processing and integrating such feedback calls for similar processes of divergent and convergent thinking as demanded in the prelaunch phase. First, receiving and processing feedback requires entrepreneurs to perform convergent thinking in order to carefully analyze the feedback and to select the most useful comments from the full set of feedback received. Having selected the most valuable feedback, they then need to apply divergent thinking to come up with original ideas on how to actively use that feedback and to advance the business opportunity based on the acquired feedback. Subsequently, entrepreneurs have to switch back to convergent thinking in order to analyze the generated ideas, select the most suitable ideas that enhance the business opportunity, and synthesize all

ideas into the business opportunity (see Cropley, 2006). As such, entrepreneurs need to continuously engage in the same repetitive cycle of divergent and convergent thinking as in the prelaunch phase in order to actively integrate acquired feedback and to further refine and develop their business opportunity (see Figure 2.1).

In sum, successfully launching a new venture requires entrepreneurs to engage in both divergent and convergent thinking as well as to flexibly switch between these two thinking styles (see Figure 2.1). While the launch phase thus demands both divergent and convergent thinking, entrepreneurs' convergent thinking should play a major role in this phase. In the launch phase, entrepreneurs need to become more focused on one single business opportunity and take specific actions and decisions to implement the opportunity. Accordingly, entrepreneurs' main task at this stage is to reduce variability via convergent thinking.

2.4.2.3 Postlaunch

After launching a new venture, entrepreneurs need to invest considerable effort to ensure and actively manage survival and continuous growth of the newly established venture (Baum et al., 1998). Venture survival and growth depend on a wide array of activities that require both divergent and convergent thinking (Gielnik, 2013; Gielnik, Frese, et al., 2012). We therefore expect venture survival and growth to call for similar levels of divergent and convergent thinking (see Figure 2.1). We further posit that the effects of divergent and convergent thinking on venture survival and venture growth are transmitted through various mechanisms (Gielnik, 2013; Gielnik, Frese, et al., 2012; Heunks, 1998).

One important mechanism that transmits the effects of both divergent and convergent thinking on venture survival and growth is leadership (see Antonakis & Autio, 2007; Baron, 2007; Ensley, Hmieleski, & Pearce, 2006). Given that growing ventures demand an increasing number of skilled employees (Baum et al., 2001; Gilbert et al., 2006), entrepreneurs need to devote substantial effort to attaining, motivating, and retaining qualified employees (Baron, 2007). Motivating and retaining employees requires entrepreneurs to perform both divergent and convergent thinking. First, entrepreneurs have to engage in divergent thinking to come up with original ideas for concepts that motivate employees such as inspiring visions and incentive systems (Fillis & Rentschler, 2010; Matthew, 2009). In addition, entrepreneurs need to perform convergent thinking to establish concrete goals, processes, and structures within the new venture. Given that new ventures often lack well-defined standard operating procedures and structures compared to more

established firms (Ensley et al., 2006), motivating and retaining employees in new ventures requires entrepreneurs to provide guidance, stability, and control in terms of consistent goals, processes, and structures (Ensley et al., 2006; Jansen, Vera, & Crossan, 2009; Williamson, 2000). Defining and sticking to specific goals, processes, and structures demands convergent thinking (see Cropley, 2006).

Furthermore, to enable the survival and growth of their new venture, entrepreneurs need to handle unpredictable and suddenly occurring barriers that have the potential to adversely impact the new venture's survival and long-term growth (Lin & Nabergoj, 2014; Mcmullan & Kenworthy, 2015; Sarasvathy, 2001; Shalley et al., 2015; Shalley & Perry-Smith, 2008). Overcoming such barriers requires entrepreneurs to improvise and to adapt to the new situation which is mainly based on divergent thinking (Baker, Miner, & Eesley, 2003; S. Huang, Ding, & Chen, 2014; Sarasvathy, 2001). As such, entrepreneurs need to continuously perform divergent thinking to generate original ideas on how to handle sudden barriers such as rapid market shifts and resource shortages (Bledow et al., 2009; Fillis & Rentschler, 2010; Frese & Fay, 2001; Kirzner, 2009; Lin & Nabergoj, 2014; Mumford, Scott, Baddis, & Strange, 2002; Wiklund & Shepherd, 2009). However, entrepreneurs also have to engage in some levels of convergent thinking to thoroughly analyze the different ideas and select the most effective solution to overcome a particular barrier (see Cropley, 2006).

To assure continuous survival and growth of the new venture, entrepreneurs further have to constantly engage in innovation (Porter, 1980; Roper, 1997; Rosenbusch et al., 2011; Thornhill, 2006). Continuous innovation is an important predictor of a new venture's success, growth, and long-term survival (e.g., Baron & Tang, 2011; Heunks, 1998; Ireland & Webb, 2007; Schumpeter, 1934). Innovation refers to the generation and implementation of novel and potentially useful ideas (Amabile, 1996; West & Farr, 1990). The literature has discussed different types of innovation, such as radical and incremental innovation or exploratory and exploitative innovation, that contribute to the performance and growth of a new venture (Groen, Wakkeee, & De Weerd-Nederhof, 2008; Harms, Walsh, & Groen, 2012; S. Huang et al., 2014; Kollmann & Stöckmann, 2014; Levinthal & March, 1993; Y. Li, Vanhaverbeke, & Schoenmakers, 2008). Radical innovation represents the introduction of completely new products, services, or processes that incorporate fundamental changes and provide substantially higher benefits compared to existing products, services, or processes (Chandy & Tellis, 1998, 2000; Raisch & Birkinshaw, 2008; Tushman & Anderson, 1986). Incremental

innovation, in contrast, refers to minor adaptations and improvements of existing products, services, or processes such as simple line extensions (Benner & Tushman, 2003; Raisch & Birkinshaw, 2008). Radical innovation departs from existing knowledge and is therefore classified into exploratory innovation which refers to the creation of knowledge that is novel to the respective firm (Benner & Tushman, 2003; Jansen, van den Bosch, & Volberda, 2006; Jansen et al., 2009; Levinthal & March, 1993; March, 1991; Phelps, 2010; Raisch & Birkinshaw, 2008; Tushman & Smith, 2002). Incremental innovation, in contrast, builds upon existing knowledge and is thus considered to be exploitative innovation which is defined as the application and development of existing knowledge (Benner & Tushman, 2003; Jansen et al., 2006, 2009; Levinthal & March, 1993; March, 1991; Raisch & Birkinshaw, 2008; Tushman & Smith, 2002). Although the different forms of innovation might call for somewhat different capabilities and activities (e.g., Gibson & Birkinshaw, 2004; He & Wong, 2004; March, 1991; W. K. Smith & Tushman, 2005), exploratory and exploitative innovation mainly demand similar processes that generally underlie innovation.

In general, innovation requires the generation, evaluation, selection, and implementation of novel and potentially useful ideas within existing ventures (Farr, Sin, & Tesluk, 2003). These steps of the innovation process strongly resemble entrepreneurs' tasks of exploring and exploiting business opportunities in the prelaunch and launch phases of the entrepreneurial process (see Amabile, 1997). Accordingly, ensuring innovation in the postlaunch phase calls for the same iterative cycle of divergent and convergent thinking as the identification of a business opportunity in the prelaunch phase and the implementation of the business opportunity in the launch phase (see Heunks, 1998; Nyström, 1979). Specifically, similar to the identification of a business opportunity in the prelaunch phase, innovation first requires entrepreneurs' divergent thinking to generate original ideas and entrepreneurs' convergent thinking to evaluate, refine, and integrate these ideas (Bledow et al., 2009). For instance, to introduce an original and useful new product to market, an entrepreneur first needs to come up with multiple original ideas for a new product via divergent thinking (Bledow et al., 2009). To ensure that the final product is not only original but also useful, an entrepreneur then has to evaluate, elaborate, and integrate the generated ideas using convergent thinking (Bledow et al., 2009; Cropley, 2006; Runco, 2003). This includes, for instance, collecting, systematically analyzing, and interpreting information

about the venture's external environment and strongly aligning the final product to the specific market needs (see Zahra & Bogner, 2000).

Then, akin to the implementation of the business opportunity in the launch phase, later stages of the innovation process require entrepreneurs to carefully plan and implement the generated ideas (Bledow et al., 2009; Cropley, 2006; Runco, 2003). For example, introducing a new product to market requires entrepreneurs to create strict plans and assemble a wide range of resources that are required for the production, delivery, and promotion of the product (Baron, 2007; Lin & Nabergoj, 2014). Also, a high rate of innovation requires entrepreneurs to implement the generated ideas using the least time, effort, and financial resources possible (Frese & Fay, 2001; Hamidi et al., 2008). Thus, planning and implementing the introduction of a new product to market requires entrepreneurs to concentrate on fully exploiting one elaborated idea without wasting resources on other activities or ideas, which is facilitated by an entrepreneur's convergent thinking and inhibited by divergent thinking (Ames & Runco, 2005; Bledow et al., 2009; Gielnik, Frese, et al., 2012; Kuratko & Welsch, 2001; Phan et al., 2010; Ward, 2004). Accordingly, similar to the exploitation of the business opportunity in the launch phase, the planning and implementation stages of the innovation process mainly call for entrepreneurs' convergent thinking. However, as in the launch phase, suddenly occurring barriers also require some level of divergent thinking in order for entrepreneurs to successfully plan and implement the ideas. For instance, while trying to implement the idea for a new product, an entrepreneur may encounter unexpected challenges which make it necessary to develop new and original ideas to overcome such implementation barriers (Baer & Frese, 2003; Rosing, Frese, & Bausch, 2011; Van de Ven, 1986). As such, to successfully plan and implement the introduction of new products to market, entrepreneurs need to flexibly alternate from convergent thinking to divergent thinking (see Figure 2.1).

In sum, similar to exploring and exploiting a business opportunity in the prelaunch and launch phases, exploratory and exploitative innovation in the postlaunch phase requires both divergent and convergent thinking as well as flexible switching between these two thinking styles (see Figure 2.1). The different nature of exploratory and exploitative innovation, however, indicates that the two types of innovation call for different proportions of divergent and convergent thinking. Exploratory innovation departs from existing knowledge and focuses on developing completely new products or services that break new grounds (Benner & Tushman, 2003; S. Huang et al., 2014; Jansen et al., 2006), thereby putting a stronger

focus on creating novel combinations of existing concepts via divergent thinking (see Bledow et al., 2009). Exploitative innovation, in contrast, builds on existing knowledge and extends established products, services, or processes (Benner & Tushman, 2003; S. Huang et al., 2014; Jansen et al., 2006), which mainly requires entrepreneurs to rely on available information from a limited number of domains that are directly related to existing products, services, or processes based on convergent thinking (see Bledow et al., 2009). As such, entrepreneurs should place an emphasis on divergent thinking when engaging in exploratory innovation while stressing convergent thinking when working on exploitative innovation (see Bledow et al., 2009). Given that short performance periods of exploratory and exploitative innovation alternating with each other are considered most effective for a new venture's performance (Bledow et al., 2009; S. Huang et al., 2014), entrepreneurs should further continuously shift their focus between divergent and convergent thinking.

2.4.3 The Cumulative Process Model: A Summary

To conclude, our comprehensive process model reveals that an entrepreneur's success is a joint function of divergent and convergent thinking. While both divergent and convergent thinking play an important role in each phase of the entrepreneurial process, the specific role of these two thinking styles shifts in the course of the entrepreneurial process (Manimala, 2009; Matthews, 2009, 2010; Nyström, 1993). Divergent thinking is most critical for an entrepreneur's success in earlier phases of the entrepreneurial process when recognizing promising business opportunities and assembling required resources call for the generation of many novel and original ideas (Gielnik, Krämer, et al., 2014; Matthews, 2009, 2010; Nyström, 1993). Convergent thinking, in contrast, becomes increasingly important in later phases of the entrepreneurial process requiring the precise evaluation and more focused implementation of these ideas to actually launch the new venture (Manimala, 2009; Nyström, 1993). Moreover, given the dynamic and chaotic nature of the entrepreneurial process, the necessities of divergent and convergent thinking alternate throughout the entrepreneurial process in an ever-changing manner. Thus, entrepreneurs need to engage in both divergent and convergent thinking as well as to flexibly switch between these two thinking styles to successfully start and run a new venture.

2.5 An Interactionist Perspective on Creativity in Entrepreneurship

Our basic model provides valuable insights into the potential positive and negative effects of creativity on an entrepreneur's success throughout the entrepreneurial process. Previous theoretical and empirical research suggests, however, that the effect of creativity on entrepreneurial success depends on boundary conditions (Woodman & Schoenfeldt, 1990; Zhou, 2008). We therefore extend our basic model by considering multiple conditions that may promote or hinder the effect of both divergent and convergent thinking on entrepreneurial success. Taking the boundary conditions into account further contributes to our understanding of the complex relationship between creativity and entrepreneurship (Dimov, 2007; Zhou, 2008).

One important boundary condition moderating the effect of divergent and convergent thinking on entrepreneurial success is the diversity of information that is available to the entrepreneur (Gielnik, Frese, et al., 2012). Building on creativity research (e.g., Mumford, Baughman, Supinski, & Maher, 1996; Mumford et al., 1991; Perttula & Sipilä, 2007), Gielnik, Frese et al. (2012) have argued that the diversity of information provided by the environment determines the potential positive effects of divergent and convergent thinking on an entrepreneur's success. First, the positive effects of divergent thinking are enhanced when diverse information is provided, while being weakened when homogeneous and constrained information from only one specific domain is available (Gielnik, Frese, et al., 2012). The underlying assumption is that divergent thinking requires entrepreneurs to combine various pieces of information from apparently unrelated domains (Cropley, 2006). Diverse information stemming from many domains should facilitate this process because it provides access to different domains that the entrepreneur can combine into novel and original ideas (Mumford et al., 1996). Constrained information from a limited number of domains, in contrast, directs an entrepreneur's thinking to a small number of domains and thus limits the number of domains an entrepreneur can draw upon to make linkages between different pieces of information (Runco & Chand, 1995). Indeed, using an experimental design with direct manipulations of the diversity of received information, Gielnik, Frese et al. (2012) provided empirical evidence that entrepreneurs' divergent thinking has a positive impact on the originality of generated business opportunities when obtaining diverse information but not when receiving constrained information. In contrast, the positive effects of convergent thinking should be increased by restricting the available information to a limited number of

domains and diminished by providing diverse information (Gielnik, Frese, et al., 2012). Convergent thinking requires entrepreneurs to focus on a low amount of information and to make associations within only one domain or a small number of directly related domains of information (Cropley, 2006). Such focused attention to a limited range of information should be facilitated by constraining information to these domains and diminished by overloading entrepreneurs with information from various domains (Brown, Tumeo, Larey, & Paulus, 1998; Coskun, Paulus, Brown, & Sherwood, 2000; Cropley, 2006).

The moderating effect of information diversity points toward further important factors that may affect the diversity of available information and thereby the potential impact of divergent and convergent thinking. For instance, one factor influencing the diversity of available information is the degree of active information acquisition (Gielnik, Krämer, et al., 2014). A high degree of active information acquisition means that entrepreneurs invest considerable time and effort into information search and actively seek more information from various sources (Frese, 2009). Accordingly, a more active search for information provides a broader information basis from several domains and thus fosters the positive effect of divergent thinking while diminishing the potential effects of convergent thinking (Baron & Tang, 2009; Gielnik, Krämer, et al., 2014; Keh, Nguyen, & Ng, 2007; Lybaert, 1998; Song, Wang, & Parry, 2010). Indeed, Gielnik, Krämer et al. (2014) provided evidence that the degree of active information search moderates the effects of divergent thinking on business opportunity identification and innovativeness of products and services such that divergent thinking only has a positive and significant effect if active information search is high.

Another important factor affecting the diversity of available information may be the heterogeneity of an entrepreneur's social network. An entrepreneur's social network potentially provides the entrepreneur with valuable information, knowledge, advice, and inspiring perspectives (Baron, 2007; Dimov, 2007; Shalley & Perry-Smith, 2008). Therefore, more heterogeneous social networks may equip an entrepreneur with more diverse information (Aldrich & Martinez, 2015; Baron, 2007; Dimov, 2007) and thus stimulate the potential of divergent thinking while diminishing the potential impact of convergent thinking. Homogeneous social networks, in contrast, may restrict the available information to a narrow domain of information, thereby limiting the potential effects of divergent thinking and increasing the positive effects of convergent thinking.

In sum, past research indicates that there are numerous boundary conditions that promote or hinder the effect of creativity on entrepreneurship, making the relationship between creativity and entrepreneurship even more complex. While a detailed discussion of these ancillary conditions is beyond the scope of this chapter, future research on the role of creativity in entrepreneurship should take these conditions into account to provide a more comprehensive understanding of the complex relationship between creativity and entrepreneurship.

2.6 Practical Implications: Promoting Creativity to Promote Entrepreneurship

Our theoretical model offers important practical implications. First and most generally, our model supports the assumption that creativity generally has a positive effect on entrepreneurial success (see Shalley & Perry-Smith, 2008; Tsai, 2014; Ward, 2004; Zhou, 2008). Moreover, building on cognition-based approaches rather than trait-based perspectives on creativity, our model posits that creativity is not an innate and stable predisposition but rather an ability that can be systematically fostered by training specific cognitive processes such as divergent and convergent thinking (see Brophy, 1998; Karimi et al., 2014; Ma, 2006; Scott, Leritz, & Mumford, 2004; Shalley & Perry-Smith, 2008; Ward et al., 1999). As such, our model indicates that it may be beneficial to systematically train entrepreneurs' creativity by incorporating creativity techniques into entrepreneurship training (e.g., DeTienne & Chandler, 2004; Gibb, 2011; Hamidi et al., 2008; Ko & Butler, 2007; Lin & Nabergoj, 2014; Lourenço & Jayawarna, 2011; Ward, 2004). Indeed, there is empirical evidence that including creativity techniques into entrepreneurship trainings positively affects participants' entrepreneurial abilities (DeTienne & Chandler, 2004; Karimi et al., 2014). However, despite this empirical evidence and scholars' repeated calls for creativity training in entrepreneurship, very little has been done to systematically stimulate creativity among entrepreneurs (Karimi et al., 2014; Karimi, Biemans, Lans, Chizari, & Mulder, 2016; Lin & Nabergoj, 2014; Nielsen & Stovang, 2015; Sarri, Bakouros, & Petridou, 2010). Against this background, our theoretical model reemphasizes the importance of future entrepreneurship education to direct more attention to systematically promoting entrepreneurs' creativity by means of creativity techniques.

Moreover, and more specifically, our comprehensive theoretical model suggests that the creativity techniques to be included in entrepreneurship training should be directed at training both divergent and convergent thinking. Our theoretical investigation points out that entrepreneurs and people aiming to becoming entrepreneurs need to engage in both types of thinking. However, past research has highlighted that most people favor either divergent or convergent thinking (Basadur, 1995; Brophy, 1998, 2001, 2006). Entrepreneurship trainers should therefore assess participants' tendencies to divergent and convergent thinking and teach them how to engage in the other way of thinking as well, for example by demonstrating to divergent thinkers the importance and potential advantages of engaging in convergent thinking in order to increase the usefulness and viability of identified business opportunities (see Basadur et al., 1982; Basadur, 1995; Brophy, 1998; Isaksen, 1983; Treffinger, 1983).

Furthermore, it may be beneficial to train entrepreneurs in their ability to flexibly switch between divergent and convergent thinking (see Bledow et al., 2009; Wolf & Mieg, 2010). Our theoretical investigation indicates that entrepreneurs need to continuously alternate between the two thinking styles according to situational demands. However, alternating between divergent and convergent thinking represents a challenging task that exceeds most people's capabilities (Brophy, 1998, 2006). Therefore, entrepreneurs and persons on their way to becoming entrepreneurs should be encouraged and systematically trained in flexibly switching between divergent and convergent thinking, for example by fostering their awareness of the dynamic nature of entrepreneurial task demands, their ability to carefully evalute the task demands, and their reflexivity (see Bledow et al., 2009).

Beyond these general suggestions applying to the entire entrepreneurial process, our comprehensive model also allows more specific recommendations on how to increase an entrepreneur's success at specific stages within the entrepreneurial process. For instance, our model indicates that entrepreneurs and people aiming at becoming entrepreneurs should place emphasis on divergent thinking in earlier phases of the entrepreneurial process while increasing the focus on convergent thinking in later phases of the entrepreneurial process. Therefore, entrepreneurship trainers should create awareness that the necessity of divergent and convergent thinking changes in the course of the entrepreneurial process which requires entrepreneurs to monitor and flexibly adapt to these changing demands. In general, it is important that entrepreneurship trainers highlight the dynamic nature of entrepreneurship (see Bledow, 2013; Bledow et al., 2009). Given that entrepreneurial success requires divergent

and convergent thinking in an ever-changing manner with both thinking styles partly having negative effects, simplistic recommendations regarding general increases of these thinking styles may have no or even detrimental effects (see Bledow, 2013; Bledow et al., 2009). Instead, to systematically foster entrepreneurial success, entrepreneurship trainers need to establish an understanding of the complex interplay between divergent and convergent thinking that dynamically determines an entrepreneur's success.

In addition, our interactionist perspective on creativity in entrepreneurship suggests that entrepreneurship training and interventions need to account for different boundary conditions in order to strengthen the potential positive effects and diminish the potential negative effects of creativity on entrepreneurial success. For instance, interventions could increase the positive effects of divergent and convergent thinking by training entrepreneurs in actively searching for appropriate information. Specifically, entrepreneurs should be trained in searching for diverse information from different disciplines for tasks requiring divergent thinking while concentrating on constrained information from selected disciplines when working on tasks demanding convergent thinking (Gielnik, Frese, et al., 2012; Gielnik, Krämer, et al., 2014).

Finally, our theoretical model also provides important implications for the composition of entrepreneurial teams. As outlined above, most people are initially inclined toward divergent or convergent thinking (Basadur, 1995; Brophy, 1998, 2001, 2006). While people could and should be systematically trained in engaging in their less preferred way of thinking as well, engaging in the unfavored thinking style may demand considerable cognitive efforts (see Bledow et al., 2009). Therefore, entrepreneurial teams may be more efficient when being composed of both members proficient in divergent thinking and members preferring convergent thinking (see Bledow et al., 2009; Erez & Nouri, 2010). Given that most ventures are started and run by entrepreneurial teams (Chowdhury, 2005; Kamm, Shuman, Seeger, & Nurick, 1990; Lechler, 2001), such a composition may contribute to the entrepreneurial success of many new ventures in the future.

2.7 Directions for Future Research

Our theoretical model provides important avenues for future research. First, future research should empirically test the main theoretical assumptions of our model. While our model is built on past theoretical and empirical research, empirical studies that systematically

test our comprehensive model are lacking. For example, while there is some empirical research testing the effects of divergent thinking on opportunity identification at the beginning of the entrepreneurial process (e.g., Gielnik, Frese, et al., 2012; Gielnik, Krämer, et al., 2014; Karimi et al., 2014), empirical studies testing the theorized effects of convergent thinking throughout the entrepreneurial process are scarce. Thus, empirical studies that systematically test the key assumptions of our comprehensive model would enhance our understanding of the role of creativity in the entrepreneurial process.

To adequately and fully test the main assumptions of our comprehensive process model, longitudinal studies examining the changing roles of divergent and convergent thinking throughout the entrepreneurial process are required (Gielnik, 2013). Most entrepreneurship research to date, however, has relied on cross-sectional approaches, leaving the understanding of how the role of cognitive processes changes over time incomplete (Baron, 2007). Our theoretical model thus echoes the call for moving toward more longitudinal studies empirically examining an entrepreneur's success and the factors influencing it over time (Baron, 2007). Past research has shown that such longitudinal studies may considerably contribute to our understanding of the fluctuating role of success factors throughout the entrepreneurial process. For instance, using a longitudinal study with repeated measurements of people's over-optimism and entrepreneurial action over 18 annual measurements waves, Dawson and Henley (2013) showed that over-optimism positively predicts a person's entry into business ownership but negatively affects his or her duration in business ownership. Applying this research method to the field of creativity and entrepreneurship, future longitudinal studies with repeated measurements of an entrepreneur's divergent thinking, convergent thinking, and entrepreneurial success could provide valuable insights into the differential effects of divergent and convergent thinking at different stages of the entrepreneurial process.

Another promising area of future research is to examine the relative importance of divergent and convergent thinking at different stages of the entrepreneurial process. Our theoretical model indicates that the pre-launch phase puts a stronger focus on divergent thinking, while the launch phase requires higher proportions of convergent thinking, and the post-launch phase calls for similar levels of both divergent and convergent thinking. Taking these theoretical assumptions a step further, future research could systematically investigate the specific proportions of divergent versus convergent thinking that are ideal for an

entrepreneur's success in different phases of the entrepreneurial process. Specifically, longitudinal studies should assess entrepreneurs' levels of divergent and convergent thinking as well as important entrepreneurial outcomes, such as opportunity identification, over time (see Rosing & Zacher, 2016). Polynomial regression analyses could then be used to specify the relative amount of divergent and convergent thinking that best predicts entrepreneurial success (Edwards & Parry, 1993; Edwards, 1994; see also Rosing & Zacher, 2016). Such research could provide valuable insights into the optimal balance of divergent and convergent thinking in each phase of the entrepreneurial process, thereby advancing our understanding of the complex relationship between an entrepreneur's creativity and success.

To further refine our theoretical model on creativity in entrepreneurship, it would be interesting to examine potential interactions and reciprocal relations between cognitive processes and entrepreneurial outcomes (see Mcmullan & Kenworthy, 2015). While our model focuses on investigating the effects of divergent and convergent thinking on entrepreneurial outcomes, entrepreneurial outcomes in turn may have recursive effects on the amount of divergent and convergent thinking needed throughout the entrepreneurial process. For instance, entrepreneurs that display high levels of divergent thinking at the beginning of the entrepreneurial process may identify a more original business opportunity (Campos et al., 2015). The originality of the business opportunity in turn may affect the amount of divergent thinking required to implement this business opportunity and thus the positive and negative effects of divergent and convergent thinking at later stages of the entrepreneurial process. Such reciprocal relations have been recently disclosed in related fields such as entrepreneurial passion (Lex, Gielnik, & Spitzmuller, 2016), personal initiative (Frese, Garst, & Fay, 2007), and proactive behavior (W.-D. Li, Fay, Frese, & Harms, 2014). For example, Lex et al. (2016) conducted two longitudinal studies with cross-lagged study designs and repeated measurements of feelings of entrepreneurial passion and entrepreneurial success over several weeks, revealing a dynamic and reciprocal relationship between feelings of entrepreneurial passion and success over time. Similarly, future research on creativity and entrepreneurship should employ cross-lagged designs and test the lagged effects between an entrepreneur's cognitive processes and entrepreneurial outcomes over time (see Lex et al., 2016). Such studies provide a strong test of the reciprocity of effects (Finkel, 1995) and may thus contribute to our understanding of the complex interplay between creativity and success in entrepreneurship.

Finally, an interesting avenue for future research would be to extend our theoretical model to the team level. Past research has highlighted that a team's cognitive processes differ from individuals' cognitive processes in various ways (Shalley & Perry-Smith, 2008). Thus, future research should investigate the role of entrepreneurial team members' divergent and convergent thinking for entrepreneurial success in the team context. As it is entrepreneurial teams that start most ventures (Chowdhury, 2005; Kamm et al., 1990; Lechler, 2001), such an investigation would further contribute to our understanding of the role of creativity in entrepreneurship.

2.8 Conclusion

In this chapter, we have provided a comprehensive theoretical investigation of the role of creativity in entrepreneurship. While we concur with past research that creativity has a positive effect on an entrepreneur's success, we argue that the relationship between creativity and entrepreneurial success is more complex than expected. Building on past research on creativity and entrepreneurship, we posit that both creativity and entrepreneurship represent complex processes that need to be disentangled into smaller components to fully understand the role of creativity in entrepreneurship (Fillis & Rentschler, 2010). Drawing upon more fine-grained conceptualizations of both creativity and entrepreneurship, we propose a comprehensive theoretical model on the changing roles of divergent and convergent thinking throughout the entrepreneurial process. Our theoretical model provides a detailed examination of the complex processes through which divergent and convergent thinking promote an entrepreneur's success at different stages of the entrepreneurial process in a cumulative manner. Such a detailed examination is important to fully understand and systematically foster the effect of creativity in entrepreneurship (Baron & Tang, 2011; Baum & Locke, 2004; Fillis & Rentschler, 2010). As such, our theoretical model provides an important step toward a more unified and inclusive framework that enhances our understanding of creativity in entrepreneurship. We hope that our model will spur further fine-grained investigations of the differential effects of divergent and convergent thinking on entrepreneurial success in order to fully understand the role of creativity in entrepreneurship.

3. Reconciling through Reciprocity: Investigating the Reciprocal Relationships between Entrepreneurial Passion, Self-Efficacy, and Success[5]

Abstract

There are contradictory theoretical perspectives on the role of passion in entrepreneurship, describing entrepreneurial passion either as predictor or as outcome of entrepreneurs' self-efficacy and success. We seek to reconcile these contrary views by integrating the different theoretical perspectives into a more inclusive model of entrepreneurial passion. Building on reciprocal causation, we hypothesize that feelings of entrepreneurial passion and entrepreneurial success dynamically and reciprocally affect each other over time. We further hypothesize that entrepreneurial self-efficacy mediates the reciprocal effects in both directions. Finally, we predict that entrepreneurial identity centrality reinforces the effects of feelings of entrepreneurial passion on entrepreneurial self-efficacy and success. To test our theoretical model, we conducted two longitudinal field studies. In Study 1, we used a repeated measures design over 12 weeks and found evidence for a reciprocal relationship between feelings of entrepreneurial passion and entrepreneurial success with entrepreneurial self-efficacy mediating the effects in both directions. In Study 2, we employed a repeated measures design over three weeks. Results showed that entrepreneurial identity centrality moderated the effects of feelings of entrepreneurial passion on entrepreneurial self-efficacy and success. Our findings reconcile conflicting perspectives on passion and emphasize the necessity to consider dynamic and reciprocal rather than unidirectional relationships.

Keywords: Entrepreneurship, passion, self-efficacy, success, identity, reciprocal relationship

[5] I presented an earlier version of this chapter in a session on "Entrepreneurship & Passion" at the 76th Annual Meeting of the Academy of Management in Anaheim, CA, USA. I also presented a paper based on part of the data at the 2016 Babson College Entrepreneurship Research Conference in Bodø, Norway.

3.1 Introduction

Passion plays a key role in entrepreneurship (e.g., Bird, 1988; Cardon et al., 2013, 2009). Scholars have described passion as "a core characteristic of great wealth creators" (Baum & Locke, 2004, p. 588) or as the "fire in the belly" (Smilor, 1997, p. 342) that characterizes successful entrepreneurs (Breugst, Domurath, Patzelt, & Klaukien, 2012). Indeed, empirical research has supported the important role of passion in entrepreneurship by showing that an entrepreneur's passion is positively related to his or her success (Baum et al., 2001; Baum & Locke, 2004).

While scholars agree on a positive relation between entrepreneurial passion and success, disagreement remains on the causal direction and the underlying mechanisms of this relationship. Scholars have presented different theoretical perspectives that view entrepreneurial passion either as predictor (e.g., Baum & Locke, 2004; Cardon et al., 2009; Murnieks et al., 2014; Shane et al., 2003) or as outcome (Collewaert et al., 2016; Gielnik, Spitzmuller, et al., 2015) of entrepreneurial success. Furthermore, some scholars (Baum et al., 2001; Baum & Locke, 2004; Murnieks et al., 2011, 2014) propose entrepreneurial self-efficacy as an outcome of entrepreneurial passion mediating the effect of passion on success, whereas others (Cardon & Kirk, 2015; Dalborg & Wincent, 2014) consider entrepreneurial self-efficacy as an antecedent rather than a consequence of passion. Each theoretical perspective provides interesting insights into factors surrounding entrepreneurial passion. However, the apparent discrepancies and competing explanations of these perspectives leave our understanding of the links between entrepreneurial passion, self-efficacy, and success incomplete. We therefore aim to integrate the different perspectives into a more inclusive model of entrepreneurial passion. Our integrative model reconciles the seemingly conflicting perspectives and deepens our understanding of the role of passion in entrepreneurship.

We build our theoretical model on the assumption that the different theoretical perspectives are complementary rather than contradictory. Each perspective focuses on unidirectional causation models in which passion predicts or is predicted by other factors in a linear and unidirectional way. However, past research has demonstrated that such unidirectional models often simplify motivational processes which are in fact much more complex (Lindsley et al., 1995; Lord et al., 2010). Motivational processes, such as feelings of passion and self-efficacy, are dynamic in nature and affect each other in dynamic and reciprocal, rather than static and unidirectional, ways (Dalal & Hulin, 2008; Lindsley et al.,

1995; Lord et al., 2010; Salanova, Llorens, & Schaufeli, 2011; Sonnentag & Frese, 2009). Building on this notion of reciprocal causation, we argue that the relations between feelings of entrepreneurial passion, self-efficacy, and success are reciprocal rather than unidirectional. Specifically, we propose that feelings of entrepreneurial passion and entrepreneurial success dynamically and reciprocally affect each other over time. Moreover, we theorize that entrepreneurial self-efficacy is a key mechanism underlying the reciprocal effects in both directions. Building on Cardon et al. (2013, 2009), we also consider the moderating role of entrepreneurial identity centrality in these relations. We argue that entrepreneurial identity centrality reinforces the effect of feelings of entrepreneurial passion on entrepreneurial success and that entrepreneurial self-efficacy mediates this moderation effect (see Figure 3.1). We provide empirical evidence for our theoretical model by conducting two longitudinal field studies with weekly measurements over 12 and three weeks. The cross-lagged design of both studies provides strong tests of the directionality and reciprocity of effects (Finkel, 1995).

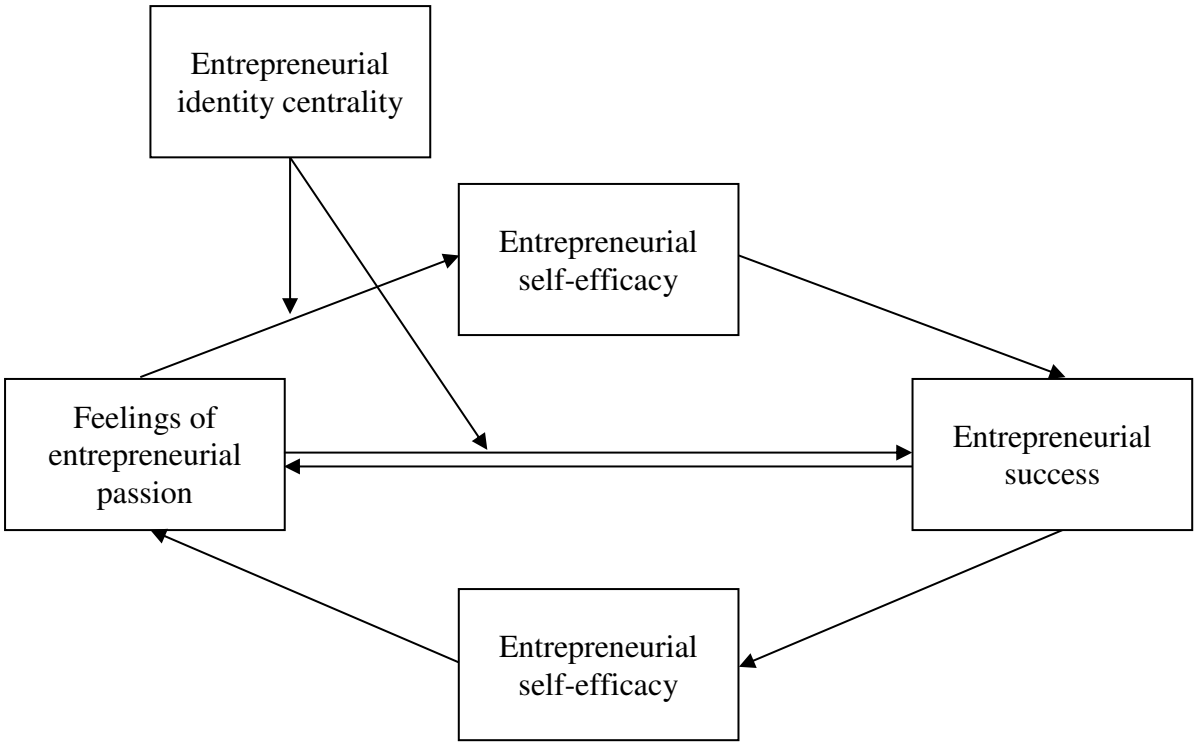


Figure 3.1. Theoretical Model on the Reciprocal Relationship between Feelings of Entrepreneurial Passion and Entrepreneurial Success

Our research seeks to contribute to the literature on entrepreneurial passion in three ways. First, we integrate hitherto fragmented theoretical perspectives into a comprehensive theoretical model of passion in entrepreneurship. Our model resolves the apparent contradictions in past research and provides a more integrated picture of the links between passion, self-efficacy, and success in entrepreneurship. Such an integrated representation deepens our understanding of how passion emerges and functions within entrepreneurs and can open new lines of theoretical and empirical investigations.

Second, we theorize and provide empirical evidence that the relations between feelings of entrepreneurial passion, self-efficacy, and success are reciprocal rather than unidirectional. As such, our research represents an important step in shifting from static and unidirectional models to more dynamic and reciprocal perspectives on passion, self-efficacy, and success in entrepreneurship (Lord et al., 2010). Our findings indicate that taking reciprocal effects into account is important to fully understand the role of passion in entrepreneurship.

Third, we add to the theoretical understanding of entrepreneurial passion by examining dynamic changes in feelings of entrepreneurial passion over time. Past research has mainly treated passion as a relatively stable trait and thus investigated its antecedents and outcomes with the help of cross-sectional designs measuring passion at only one point in time (e.g., Baum et al., 2001; Baum & Locke, 2004; Murnieks et al., 2011). However, recent research showed that feelings of passion vary substantially within persons over time (Collewaert et al., 2016; Gielnik, Spitzmuller, et al., 2015). We thus answer repeated calls for longitudinal studies investigating the development and dynamics of feelings of passion over time (Cardon, Foo, Shepherd, & Wiklund, 2012; Cardon et al., 2013). We conduct two longitudinal studies using cross-lagged designs with repeated measures of feelings of entrepreneurial passion over 12 and three weeks. This allows us to examine changes in feelings of passion over time, and how these changes are affected by entrepreneurs' self-efficacy and success. We also investigate how feelings of entrepreneurial passion predict changes in entrepreneurial self-efficacy and success. Thereby, we rigorously test the mechanisms leading to and from feelings of entrepreneurial passion (Finkel, 1995; Lian et al., 2014).

3.2 Passion and Entrepreneurship

Entrepreneurial passion refers to "consciously accessible, intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are

meaningful and salient to the self-identity of the entrepreneur" (Cardon et al., 2009, p. 517). As such, entrepreneurial passion encompasses two distinct dimensions, i.e., intense positive feelings and identity centrality (Cardon et al., 2013). Whereas intense positive feelings may vary considerably over time depending on an entrepreneur's self-efficacy and success, an entrepreneur's identity centrality remains relatively stable over time (Collewaert et al., 2016; see also Serpe, 1987; Stryker & Burke, 2000). Given that our studies focus on relatively fast changing processes, we disentangle entrepreneurial passion and examine its two dimensions, i.e., fast changing feelings of entrepreneurial passion and relatively stable entrepreneurial identity centrality, separately. As such, we depart from Cardon et al.'s (2013, 2009) approach and do not integrate both dimensions into one measure of entrepreneurial passion.

Entrepreneurial success has been defined in multiple ways (Makhbul & Hasun, 2011). The appropriate definition depends on the stage of the entrepreneurial process (Baron, 2007). In Study 1, our participants were in the process of starting a new business and thus at the beginning of the entrepreneurial process. In Study 2, our sample comprised existing business owners, of which some had not made any sales or profit yet. Thus, our research focuses on early phases of the entrepreneurial process, in which financial outcomes are not necessarily available and in which an entrepreneur's success is better reflected by more qualitative indicators (Baron, 2007; Demirbag, Tatoglu, & Glaister, 2007; van Gelderen, van der Sluis, & Jansen, 2005). We therefore define entrepreneurial success as the performance of the entrepreneur as a business owner and the progress he or she makes in starting and running the new venture (see Davidsson, 2016; Florin, 2005). Entrepreneurial self-efficacy represents an individual's belief in his or her capability to successfully perform the roles and tasks of an entrepreneur (Chen, Greene, & Crick, 1998). In the following, we present the theoretical rationale underlying our reciprocal model. Our model incorporates multiple causal effects between feelings of entrepreneurial passion, self-efficacy, and success which operate through different psychological mechanisms. Explaining these complex mechanisms requires drawing on different theoretical approaches. We thus build on different theories to argue for all causal effects making up our reciprocal model.

3.2.1 The Passion-to-Success Link

We propose that feelings of entrepreneurial passion have a positive effect on entrepreneurial success (see Figure 3.1). We draw on Cardon et al.'s (2009) theory of

entrepreneurial passion to derive this hypothesis. Cardon et al. (2009) describe entrepreneurial passion as a strong motivational driver fostering entrepreneurs' success. The positive feelings underlying entrepreneurial passion energize entrepreneurs to devote great effort to their entrepreneurial task, to persist in spite of obstacles, and to succeed in the entrepreneurial process (e.g., Baum & Locke, 2004; Cardon et al., 2009; Cardon, Zietsma, Saparito, Matherne, & Davis, 2005; Fredrickson, 2001). Indeed, there is empirical evidence linking feelings of entrepreneurial passion to success (Baum et al., 2001; Baum & Locke, 2004; Drnovsek, Cardon, & Patel, 2016). Building on the theoretical evidence, we hypothesize:

Hypothesis 1. Feelings of entrepreneurial passion have a positive effect on entrepreneurial success.

3.2.2 The Mediating Role of Entrepreneurial Self-efficacy in the Passion-to-Success Link

We suggest that the effect of feelings of entrepreneurial passion on entrepreneurial success is mediated through entrepreneurial self-efficacy (see Figure 3.1). We draw upon affect-as-information theory (Schwarz & Clore, 1983) and social cognitive theory (Bandura, 1997) to argue for a positive effect of feelings of entrepreneurial passion on entrepreneurial self-efficacy. Affect-as-information theory proposes that people interpret their feelings as information about their ability to perform a certain task with positive feelings leading to more positive evaluations of their capabilities (Clore et al., 2001; Schwarz & Clore, 1983). Similarly, social cognitive theory states that people's feelings directly affect their self-efficacy (Bandura, 1988; R. Wood & Bandura, 1989). Negative feelings are interpreted as signs of low capability, whereas positive feelings are indicators of high capability (Bandura, 1988; R. Wood & Bandura, 1989). Accordingly, entrepreneurs interpret the positive feelings associated with passion as sign of their entrepreneurial ability and become self-efficacious concerning their entrepreneurial tasks. Indeed, research has provided evidence that feelings of entrepreneurial passion foster entrepreneurs' self-efficacy (Baum et al., 2001; Baum & Locke, 2004; Huyghe, Knockaert, & Obschonka, 2016; Murnieks et al., 2011, 2014).

Entrepreneurial self-efficacy in turn promotes entrepreneurial success. According to social cognitive theory (Bandura, 1997), a strong belief in one's capabilities positively impacts various self-regulatory processes which are conducive to an entrepreneur's success.

For example, people with a strong confidence in their abilities set more challenging goals and are more committed to achieve these goals than people low in self-efficacy (Bandura, 1988; Locke & Latham, 1990, 2002; Phillips & Gully, 1997). Also, self-efficacious people invest more effort and are more likely to persist in the face of obstacles because they are convinced that they can overcome these obstacles and succeed (Bandura, 1988; Locke & Latham, 1990). Entrepreneurs are permanently confronted with obstacles that require great effort and persistence to be overcome (Frese, 2009). Building on these theoretical notions, a multitude of studies have provided evidence that an entrepreneur's self-efficacy is positively linked to his or her entrepreneurial success (e.g., Anna, Chandler, Jansen, & Mero, 2000; Baum et al., 2001; Baum & Locke, 2004; Forbes, 2005; Hmieleski & Corbett, 2008; Rauch & Frese, 2007). We argued that feelings of entrepreneurial passion foster entrepreneurial self-efficacy and that entrepreneurial self-efficacy in turn has a positive impact on entrepreneurial success. Taken together, this leads us to the following hypothesis:

Hypothesis 2. Entrepreneurial self-efficacy mediates the positive effect of feelings of entrepreneurial passion on entrepreneurial success.

3.2.3 The Moderating Role of Entrepreneurial Identity Centrality in the Passion-to-Success Link

We also suggest that the effect of feelings of entrepreneurial passion on entrepreneurial success is moderated by entrepreneurial identity centrality and that this moderation effect is mediated by entrepreneurial self-efficacy (see Figure 3.1). Entrepreneurial identity centrality refers to the relative importance of the entrepreneurial role to one's self-concept (Hoang & Gimeno, 2010; McCall & Simmons, 1966; Murnieks et al., 2014). People with high entrepreneurial identity centrality internalize the entrepreneurial role into their self-schema and consider entrepreneurship to be an important part of who they are (Cardon et al., 2009; Murnieks et al., 2014; Stryker & Serpe, 1982). Entrepreneurial identity centrality takes a central role in Cardon et al.'s (2009) theory of entrepreneurial passion. According to Cardon et al. (2013, 2009), an entrepreneur's identity centrality strengthens the positive effects of feelings of passion on favorable outcomes such as persistence, success, and venture growth (see also Cardon & Kirk, 2015; Drnovsek et al., 2016). Whereas feelings of passion generally provide motivational energy promoting entrepreneurs' success, the impact of such feelings directed toward the entrepreneurial role is stronger if the entrepreneurial role is central to

one's self-concept (Cardon et al., 2013, 2009; Drnovsek et al., 2016). As such, the effect of feelings of entrepreneurial passion on entrepreneurial success is stronger in case of high entrepreneurial identity centrality compared to low entrepreneurial identity centrality.

Hypothesis 3. Entrepreneurial identity centrality moderates the effect of feelings of entrepreneurial passion on entrepreneurial success. The positive effect of feelings of entrepreneurial passion on entrepreneurial success is stronger in case of high entrepreneurial identity centrality compared to low entrepreneurial identity centrality.

We further argue for a mediated moderation model in which the moderating effect of entrepreneurial identity centrality on the effect of feelings of entrepreneurial passion on entrepreneurial success is mediated by entrepreneurial self-efficacy (see Figure 3.1). We follow our prior line of reasoning and draw upon affect-as-information theory (Schwarz & Clore, 1983) and social cognitive theory (Bandura, 1997) to argue for an reinforcing effect of entrepreneurial identity centrality on the impact of feelings of passion on entrepreneurial self-efficacy. Feelings of passion generally increase entrepreneurs' self-efficacy because entrepreneurs tend to interpret the positive feelings as signs of high entrepreneurial capability (e.g., Bandura, 1988; Schwarz & Clore, 1983; R. Wood & Bandura, 1989). However, the extent to which people rely on their feelings as indicators of their ability depends on people's cognitive structures and values (Bandura, 1988, 1991; Schwarz, 2011). People who attach greater importance to specific activities and their performance in these activities direct more attention toward informational cues about their performance and thus observe their feelings more intensively to gain self-diagnostic information (Bandura, 1991). Also, people who place a high value on performing well on a certain task are more likely to interpret their feelings as important feedback about their ability to successfully perform that task (Clore et al., 2001). Accordingly, people with high entrepreneurial identity centrality, who view entrepreneurial activities and their performance in these activities as more important than people low in entrepreneurial identity centrality (Murnieks et al., 2014), draw stronger inferences regarding their efficacy from feelings of entrepreneurial passion.

We hypothesized that feelings of entrepreneurial passion have a positive effect on entrepreneurial success, and that this effect is mediated by entrepreneurial self-efficacy and moderated by entrepreneurial identity centrality. We have now argued that entrepreneurial identity centrality moderates the effect of feelings of passion on entrepreneurial self-efficacy. Altogether, this suggests that the moderating effect of entrepreneurial identity centrality on

the effect of feelings of passion on entrepreneurial self-efficacy is responsible for the overall moderating effect of entrepreneurial identity centrality on the effect of feelings of passion on entrepreneurial success (Muller, Judd, & Yzerbyt, 2005). As such, entrepreneurial self-efficacy mediates the moderating effect of entrepreneurial identity centrality on the effect of feelings of entrepreneurial passion on entrepreneurial success. We thus hypothesize:

> *Hypothesis 4. Entrepreneurial self-efficacy mediates the moderating effect of entrepreneurial identity centrality on the effect of feelings of entrepreneurial passion on entrepreneurial success.*

3.2.4 Toward a Reciprocal Model of Entrepreneurial Passion, Self-efficacy, and Success

Hypotheses 1 to 4 built on past research which has commonly described entrepreneurial passion as a strong motivational driver, predicting an entrepreneur's self-efficacy and success in a linear and unidirectional way (e.g., Baum et al., 2001; Baum & Locke, 2004; Cardon et al., 2009; Murnieks et al., 2011, 2014). While such unidirectional causation models have provided valuable insights into the potential power of passion, theoretical notions of dynamism and reciprocity indicate that the relations between feelings of passion, self-efficacy, and success are not only unidirectional but bidirectional (e.g., Lindsley et al., 1995; Lord et al., 2010; Sonnentag & Frese, 2009). In fact, multiple theoretical and empirical studies have shown that feelings of entrepreneurial passion (Collewaert et al., 2016; Gielnik, Spitzmuller, et al., 2015), self-efficacy (Gist & Mitchell, 1992; Shea & Howell, 2000), and success (Sonnentag & Frese, 2009; Uy, Foo, & Ilies, 2015) are dynamic processes that operate in dynamic and reciprocal ways. Building on this robust evidence, we extend the hitherto unidirectional perspectives on passion in entrepreneurship and propose reciprocal relations between feelings of entrepreneurial passion, self-efficacy, and success over time. Accordingly, we suggest that feelings of passion are not only a predictor but also an outcome of entrepreneurs' self-efficacy and success (see Figure 3.1).

3.2.5 The Success-to-Passion Link

We argue that entrepreneurial success has a recursive positive effect on feelings of entrepreneurial passion (see Figure 3.1). We build our argumentation on goal setting theory (Locke & Latham, 2002) and social cognitive theory (Bandura, 1997). Both theories concur

that making progress and attaining one's goals results in positive feelings. According to goal setting theory, making progress toward a goal reduces the negative discrepancy between the current state and the desired goal and, thus, fosters positive feelings (Locke & Latham, 1990; Mento, Locke, & Klein, 1992). Similarly, social cognitive theory suggests that accomplishing goals and achieving success on a given task produces positive evaluative reactions toward the task that are associated with passion such as enthusiasm and deep immersion (Bandura, 1988). Gielnik, Spitzmuller et al. (2015) provided evidence for this theoretical perspective by showing that being successful in starting a business leads to feelings of entrepreneurial passion. We follow this theoretical perspective and hypothesize:

Hypothesis 5. Entrepreneurial success has a positive effect on feelings of entrepreneurial passion.

3.2.6 The Mediating Role of Entrepreneurial Self-efficacy in the Success-to-Passion Link

We argue that the effect of entrepreneurial success on feelings of entrepreneurial passion is mediated by entrepreneurial self-efficacy (see Figure 3.1). According to social cognitive theory (Bandura, 1997), success or mastery experiences are the most effective determinants of self-efficacy. Being successful in attaining one's goals in a specific field of action strengthens people's belief in their capability to succeed (Bandura, 1988, 1991). Indeed, many studies have provided evidence that success promotes self-efficacy (e.g., Bandura, Adams, & Beyer, 1977; Heggestad & Kanfer, 2005; Sitzmann & Yeo, 2013).

Entrepreneurial self-efficacy fosters feelings of entrepreneurial passion. Social cognitive theory posits that people's self-efficacy toward a task impacts their feelings and inclination toward performing that task (Bandura, 1988; Gist & Mitchell, 1992). People with high self-efficacy expect that their efforts will lead to success and desirable outcomes (Bandura, 1988; Cardon & Kirk, 2015). The anticipation of achieving success and a desired goal leads to positive feelings toward the task that characterize passion such as enthusiasm, deep involvement, and affective enjoyment (Bandura, 1991; Baum & Locke, 2004; Cardon & Kirk, 2015). Indeed, studies have shown that entrepreneurial self-efficacy elevates feelings of entrepreneurial passion (Cardon & Kirk, 2015; Dalborg & Wincent, 2014). We argued that entrepreneurial success predicts entrepreneurs' self-efficacy which in turn boosts feelings of entrepreneurial passion. We therefore submit Hypothesis 6:

Hypothesis 6. Entrepreneurial self-efficacy mediates the positive effect of entrepreneurial success on feelings of entrepreneurial passion.

We conducted two longitudinal studies to test our hypotheses. In Study 1, we examined Hypotheses 1, 2, 5, and 6 using a repeated measures design with 180 participants of an action-based entrepreneurship training over 12 weeks. In Study 2, we tested Hypotheses 1 to 6 by employing a repeated measures design with 65 business owners over three weeks.

3.3 Study 1: Methods

3.3.1 Study Setting

We conducted our study in the context of an action-based entrepreneurship training which was similarly performed by Gielnik, Frese et al. (2015) in another country. The training took place from March to June 2014. The training comprised 12 weekly sessions of three hours each. The sessions covered topics from the domains of entrepreneurship, business administration, and psychology: (1) Identifying business opportunities, (2) Business plan, (3) Legal and regulatory issues, (4) Acquiring starting capital, (5) Accounting, (6) Marketing, (7) Cash-flow management, (8) Leadership and strategic management, (9) Planning and implementing plans, (10) Personal initiative, (11) Persuasion and negotiation, and (12) Networking. The sessions were delivered by 10 lecturers from University of Dar es Salaam in Tanzania who had received thorough training on the action-based approach of the training.

The entrepreneurship training was action-based, implying that participants started and operated micro-businesses in the course of the training. In the first session of the training, participants formed entrepreneurial teams of four to seven persons. Each team was asked to identify a business opportunity and to launch a business with the goal of making profit within the 12-week training period. The teams should go through the entire entrepreneurial process from identifying a business opportunity to launching and managing a business under real business conditions. To enable them doing so, each team received starting capital of approximately 100 USD which was to be returned at the end of the training. The teams started different types of businesses such as providing microcredit to students, selling organic eggs, and printing and selling t-shirts. Participants performed all major activities required by entrepreneurs. For instance, they assembled resources, negotiated with potential suppliers,

and introduced their products or services to the market. In such an action-based entrepreneurship training, participants' feelings of entrepreneurial passion, self-efficacy, and success substantially change over time, making this training context an appropriate research context for examining reciprocal relations between these variables.

3.3.2 Sample

Our sample consisted of 180 undergraduate students from University of Dar es Salaam in Tanzania, who participated in the entrepreneurship training described above. Training participants were recruited through student mailing lists, leaflets, and personal communication. Students from all faculties and from all years of study were eligible for participation. The training was voluntary and not part of the regular curriculum. Participants received certificates confirming successful participation at the end of the training.

To apply for the training, students had to submit an application form and a baseline questionnaire. In total, 405 students applied for the training. Due to limited training capacities we randomly assigned 224 students to the training. The 224 training participants were divided into four classes encompassing approximately 56 students each. Out of the 224 participants, 44 (19.6%) participants did not attend the training regularly (i.e., attended less than eight out of 12 sessions). We excluded these participants from our statistical analyses to assure that all study participants were working on their businesses, resulting in a final sample of 180 study participants. Independent-samples *t*-tests revealed that participants attending regularly did not differ significantly from those who did not attend regularly in terms of any variable assessed before the training. This suggests that participants dropped out for reasons unrelated to study variables and that missing data did not result in any potential bias (Little & Rubin, 1987). In the final sample, 141 (78.3%) participants were male. Participants' age ranged from 20 to 34 years (M = 23.72; SD = 2.11). Most participants were in the third (68.9%) or second (16.9%) year of study. Students came from different faculties such as Business School (69.5%), College of Social Sciences (11.7%), and College of Natural and Applied Sciences (5.4%).

Before participation, each participant was briefed both orally and in writing on the process of the training and the data collection, the required commitment, and the benefits that would result from participating in the training. Also, participants were informed on the use of their data in research, the voluntariness of their participation, and their right to withdraw from

the research at any point in time. By signing the application form, each participant agreed to participate in the training and research. All participants were assured strict confidentiality.

3.3.3 Study Design and Procedure

We used a repeated measures design encompassing 12 measurement waves (T1-T12). The 12 measurement waves took place in the 12 training sessions. There was a time lag of one week between each measurement wave. A time lag of one week is considered adequate to detect dynamic changes and reciprocal relations between feelings of entrepreneurial passion, self-efficacy, and success over time (Dormann & Griffin, 2015; Gielnik, Spitzmuller, et al., 2015). At each measurement wave, we collected data using questionnaires that were distributed among training participants at the end of the training session. In addition to the 12 weekly questionnaires, participants completed a baseline questionnaire on demographic and control variables approximately one week before the start of the training (T0).

We assessed feelings of entrepreneurial passion and entrepreneurial self-efficacy four times each with three weeks in between. We measured entrepreneurial success in every week from the second week on. Our study design thus corresponds to a cross-lagged design. On average, participants completed 10.5 questionnaires leading to a total number of 1,889 observations (response rate of 87.5%). Missing data were deleted pairwise.

3.3.4 Measures

Feelings of entrepreneurial passion. We assessed feelings of entrepreneurial passion at T2, T5, T8, and T11. We used two items adapted from Cardon et al.'s (2013) measure. Cardon et al. (2013) developed three scales to ascertain entrepreneurs' passion for inventing, founding, and developing a business. Past research has confirmed the predictive validity of the passion for inventing and passion for founding scales (Cardon & Kirk, 2015). We adapted our items from the passion for inventing and passion for founding scales because our study participants were mainly involved in the invention and foundation phases of their businesses. Of each scale, we selected the stem of the item that captured intense positive feelings and that had the highest factor loading in Cardon et al.'s (2013) study. We adapted our items so that the items referred to the business idea the students were working on during the training.

We shortened Cardon et al.'s (2013) scale to two items to prevent survey fatigue and to enhance response rates (Gosling, Rentfrow, & Swann, 2003; Rogelberg & Stanton, 2008)

which is in line with past research employing diary studies (Bakker & Bal, 2010; Foo, Uy, & Baron, 2009; Uy, Foo, & Aguinis, 2010). The two items were "*I am very excited about the business idea of our team*" and "*I feel energized when I think about putting our business idea into practice*". Participants provided their answers on a 7-point response scale ranging from 1 (*not at all*) to 7 (*absolutely*). We combined the two items into one scale of feelings of entrepreneurial passion by computing the mean. The mean Cronbach's Alpha over all four measurement waves was α = .63. Cronbach's Alpha is considerably affected by the number of items in a scale and thus reflects the low number of items of our measure (Cortina, 1993).

Entrepreneurial success. We ascertained entrepreneurial success at T2 to T12. Past research has proposed several measures of entrepreneurial success (Murphy, Trailer, & Hill, 1996) and often relied on financial indicators such as profit, earnings, or sales (Ayala & Manzano, 2014; Marvel, Davis, & Sproul, 2016). Financial measures, however, are often not available at early stages of the entrepreneurial process, given that new ventures rarely make profit or sales during the first weeks or months of operation (Baron, 2007; Demirbag et al., 2007; van Gelderen et al., 2005). Moreover, financial measures solely capture the economic performance of the venture and neglect further important entrepreneurial goals that reflect an entrepreneur's success at early stages of the entrepreneurial process such as identifying a viable business opportunity, developing products or services, or writing a business plan (Olsen & Kolvereid, 1994; Venkatraman & Ramanujam, 1986). As such, to fully capture entrepreneurs' performance as a business owner and the progress they make in starting and running the new venture, i.e., entrepreneurial success, subjective measures assessing the entrepreneur's progress and goal achievement may be more appropriate (see Davidsson, 2016). We thus measured entrepreneurial success using four questionnaire items developed and adapted based on Pearce and Sims' (2002) and Baer and Frese's (2003) measures. All items started with the stem "*In the last week*" followed by the following statements: "*we made good progress in starting and running our team business*", "*the team did a very good job*", "*we achieved the goals we have set for the team business*", and "*it has become more likely that our team business will be successful*". The items reflect perceived progress in starting and running the new venture to which individuals contributed as team members. We used a 7-point response scale from 1 (*not at all*) to 7 (*absolutely*). We computed the mean over the items to create a scale of entrepreneurial success (mean Cronbach's Alpha = .93).

Using a sample of existing firms, Baer and Frese (2003) showed that their self-report measure of entrepreneurial success significantly correlated with more objective measures (see also Wall, Michie, Patterson, Wood, & Sheehan, 2004). To validate the self-report measure of entrepreneurial success in our study, we asked participants at the end of the study how much profit they had made in the course of the 12-week training. We found a significant positive correlation (r = .29, p < .01) between the self-report measure over the last four measurement waves and the profit reported at the end of the training. According to a recent empirical analysis (Bosco, Aguinis, Field, & Pierce, 2015), the size of the correlation corresponds to a large effect and thus provides evidence for the validity of the self-report measure. The large effect is remarkable, given that our self-report measure and profit capture different dimensions of performance. Our measure went beyond financial performance and assessed entrepreneurs' overall progress and performance as business owners which includes tasks that do not directly result in profit (Olsen & Kolvereid, 1994; Venkatraman & Ramanujam, 1986).

Entrepreneurial self-efficacy. We measured entrepreneurial self-efficacy at T1, T4, T7, and T10. We used four items from Gielnik, Frese et al.'s (2015) scale. Gielnik, Frese et al. (2015) developed the scale to assess entrepreneurship training participants' self-efficacy based on Bandura's (1989) theoretical conceptualization of self-efficacy and confirmed its predictive validity in African settings. Following Bandura (1989), who emphasized the need to assess task-specific self-efficacy, the items referred to tasks and activities that are specifically relevant at the beginning of the entrepreneurial process. All items started with the general stem "*How confident are you that you can*" followed by specific start-up activities. The start-up activities were "*start a business*", "*become self-employed*", "*overcome problems when starting a business*", and "*manage a business well*". We used a 7-point response scale anchoring from 1 (*20%*) to 7 (*100%*). The mean of the four items formed the score for entrepreneurial self-efficacy (mean Cronbach's Alpha = .90).

Control variables. We included gender, entrepreneurial experience, and entrepreneurial team size as control variables. We controlled for gender and entrepreneurial experience because these factors have been shown to promote feelings of entrepreneurial passion, self-efficacy, and success (e.g., Bates, 2002; Cardon et al., 2013; Davidsson & Honig, 2003; Unger, Rauch, Frese, & Rosenbusch, 2011; Wilson, Kickul, & Marlino, 2007; Zhao, Seibert, & Hills, 2005). We assessed gender (0 = *female*, 1 = *male*) and entrepreneurial experience in

the baseline questionnaire before the training (T0). We measured entrepreneurial experience by asking participants whether they were a business owner at the time of the study or had ever started a business in the past (0 = *no*, 1 = *yes*). We included entrepreneurial team size as another control variable because the size of participants' entrepreneurial teams may affect the relationships between individuals' feelings of entrepreneurial passion, self-efficacy, and their team's entrepreneurial success (K. G. Smith et al., 1994; Stroebe & Frey, 1982). We ascertained entrepreneurial team size by counting the number of persons in each team at the first measurement wave (T1). In addition, we controlled for the measurement wave in all analyses to partial out potential learning or trend effects.

3.3.5 Method of Analysis

Our data were multiple observations (level 1) that were nested in individuals (level 2) that in turn were nested in teams (level 3). The three-level nested structure of our data suggests that our data are non-independent. Ignoring the non-independence of data would lead to inflated standard errors and bias the significance tests of the regression coefficients (Bliese & Ployhart, 2002; Ployhart & Vandenberg, 2010). We thus conducted all analyses using random coefficient modeling (Bryk & Raudenbush, 1992; Ployhart & Vandenberg, 2010), which accounts for the dependency of the data and provides unbiased parameter estimations (Bliese & Ployhart, 2002). To conduct random coefficient modeling, we created a three-level hierarchical data structure with our repeated measures variables on level 1, gender and entrepreneurial experience on level 2, and entrepreneurial team size and team membership on level 3. For each repeated measures variable, we created lagged versions of the variable, i.e., variables representing the level of the respective variable one, two, and three measurement waves later. This data structure allowed us to test lagged effects of the predictor at one time point on the dependent variable at a later time point. We performed the random coefficient modeling analyses using the package nlme (Pinheiro, Bates, DebRoy, Sarkar, & R Core Team, 2014) included in R (R Core Team, 2014). We estimated linear mixed-effects models using restricted maximum likelihood estimation (Bliese & Ployhart, 2002). In all models, the effect of the individual and the effect of the team were treated as random intercepts. We used a time lag of one, two, or three weeks between the predictor and dependent variable in all models. Furthermore, we controlled for prior levels of the dependent variable in all models to control for autoregression and to model change rather than absolute

levels of the dependent variable. The temporal separation of the predictor and dependent variable and controlling for autoregression enabled us to draw stronger conclusions of causality (Blalock, 1961; Ployhart, Weekley, & Ramsey, 2009).

3.4 Study 1: Results

3.4.1 Preliminary Analyses

Tables 3.1 and 3.2 present the means, standard deviations, and correlations of all variables on level 1 and level 2, respectively. We tested for multicollinearity by calculating variance inflation factor (VIF) scores for all variables in all linear mixed-effects models. All VIF scores were below 2.5, indicating that multicollinearity was not a concern in the present study (Allison, 1999). We computed a set of null models to estimate the within-person variance in feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success. The null models showed that 72% of the total variance in feelings of entrepreneurial passion, 57% of the total variance in entrepreneurial self-efficacy, and 57% of the total variance in entrepreneurial success was within-person variance. These results demonstrate that all repeated measures variables varied substantially within individuals over time which is an important prerequisite for conducting random coefficient modeling.

To test whether our study variables were distinct variables, we conducted confirmatory factor analyses using the package lavaan (Rosseel, 2012) in R (R Core Team, 2014). Given that our repeated measures variables were assessed at different measurement waves, we conducted a series of confirmatory factor analyses for each pair of variables and each measurement wave. In each case, the theorized two-factor solution had a significantly better model fit than the one-factor solution (minimum Chi^2-difference (1) = 9.92, $p < .01$). These results indicate that feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success were three distinct factors.

Table 3.1

Study 1: Means, Standard Deviations, and Correlations of Study Variables on Level 1 (Level of Observations)

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. ESE T1	5.58	0.99	–																	
2. ESE T4	5.86	0.85	.50**	–																
3. ESE T7	6.04	0.82	.46**	.50**	–															
4. ESE T10	6.13	0.76	.42**	.42**	.59**	–														
5. FEP T2	5.98	0.95	.11	.09	.14	-.02	–													
6. FEP T5	5.96	0.98	.25**	.25**	.31**	.22*	.25**	–												
7. FEP T8	5.98	0.92	.25**	.20*	.46**	.29**	.27**	.19*	–											
8. FEP T11	5.87	1.00	.18*	.20**	.26**	.47**	.23**	.31**	.38**	–										
9. SUC T2	5.62	1.10	.33**	.24**	.16†	.19*	.26**	.16	.18*	.22**	–									
10. SUC T3	5.61	1.00	.27**	.24**	.32**	.21**	.12	.39**	.26**	.25**	.27**	–								
11. SUC T4	5.50	1.06	.17*	.35**	.23**	.17*	-.07	.24**	.20*	.22**	.22**	.65**	–							
12. SUC T5	5.80	0.80	.34**	.31**	.31**	.33**	.03	.27**	.31**	.25**	.48**	.39**	.46**	–						
13. SUC T6	5.81	0.80	.30**	.29**	.47**	.36**	.08	.17†	.51**	.37**	.36**	.39**	.36**	.57**	–					
14. SUC T7	5.77	0.90	.46**	.23**	.49**	.38**	.06	.25**	.33**	.16†	.26**	.51**	.38**	.47**	.54**	–				
15. SUC T8	5.78	0.90	.39**	.20*	.45**	.34**	-.05	.10	.44**	.23**	.30**	.38**	.28**	.42**	.60**	.63**	–			
16. SUC T9	5.74	0.95	.19*	.26**	.34**	.52**	.00	.13	.40**	.51**	.18*	.29**	.44**	.36**	.51**	.38**	.59**	–		
17. SUC T10	5.67	1.10	.23**	.25**	.34**	.50**	.03	.10	.35**	.53**	.18*	.22**	.31**	.39**	.46**	.44**	.42**	.70**	–	
18. SUC T11	5.73	1.16	.34**	.30**	.35**	.50**	-.03	.20*	.44**	.60**	.29**	.38**	.40**	.47**	.63**	.51**	.57**	.66**	.79**	–
19. SUC T12	5.98	1.08	.29**	.26**	.23**	.38**	.03	.17*	.33**	.47**	.25**	.27**	.23**	.37**	.45**	.41**	.43**	.35**	.45**	.69**

Note. 105 < *N* < 169. ESE = Entrepreneurial self-efficacy. FEP = Feelings of entrepreneurial passion. SUC = Entrepreneurial success. † $p < .10$, * $p < .05$, ** $p < .01$.

Table 3.2

Study 1: Means, Standard Deviations, and Correlations of Study Variables on Level 2 (Individual Level)

	M	*SD*	1	2	3	4	5
1. Gender [a]	0.78	0.41	–				
2. Entrepreneurial experience [b]	0.46	0.50	.16*	–			
3. Entrepreneurial team size	5.89	1.00	.05	.07	–		
4. Entrepreneurial self-efficacy	5.90	0.69	-.09	.11	-.06	–	
5. Feelings of entrepreneurial passion	5.93	0.69	-.08	.16*	.13†	.40**	–
6. Entrepreneurial success	5.72	0.71	-.26**	-.05	.07	.57**	.51**

Note. N = 180 participants nested in 34 teams. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. † $p < .10$, * $p < .05$, ** $p < .01$.

3.4.2 Hypothesis Testing

Hypothesis 1 states that feelings of entrepreneurial passion have a positive effect on entrepreneurial success. To test this hypothesis, we ran a linear mixed-effects model with feelings of entrepreneurial passion as predictor variable and entrepreneurial success in the subsequent week as dependent variable. As shown in Model 4 of Table 3.3, feelings of entrepreneurial passion had a significant positive effect on entrepreneurial success (b = 0.10, SE = 0.04, $t(361) = 2.72$, $p < .01$) providing empirical evidence for Hypothesis 1.

According to Hypothesis 2, the effect of feelings of entrepreneurial passion on entrepreneurial success is mediated through entrepreneurial self-efficacy. Feelings of entrepreneurial passion had a positive and significant effect on entrepreneurial self-efficacy (b = 0.09, SE = 0.04, $t(157) = 2.40$, $p < .05$, see Model 2 in Table 3.3). Entrepreneurial self-efficacy in turn had a significant positive effect on entrepreneurial success (b = 0.29, SE = 0.07, $t(153) = 4.39$, $p < .01$, see Model 5 in Table 3.3). We tested for mediation by conducting the Monte Carlo method (MacKinnon, Lockwood, & Williams, 2004) using a web-based calculator (Selig & Preacher, 2008). The Monte Carlo method provides a confidence interval around the indirect effect. Analyses based on 20,000 replications showed that the 95% confidence interval excluded zero which indicates a significant indirect effect of feelings of entrepreneurial passion on entrepreneurial success through entrepreneurial self-efficacy (indirect effect = .03, $p < .05$) and thus supports Hypothesis 2.

Table 3.3

Study 1: Results from Random Coefficient Modeling testing the Direct and Indirect Effect of Feelings of Entrepreneurial Passion on Entrepreneurial Success through Entrepreneurial Self-efficacy

	Entrepreneurial self-efficacy (lagged)				**Entrepreneurial success (lagged)**					
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables										
Gender [a]	-0.15[†]	0.09	-0.14	0.09	-0.18*	0.09	-0.18*	0.09	-0.22[†]	0.12
Entrepreneurial experience [b]	0.11	0.07	0.09	0.07	0.08	0.07	0.05	0.07	-0.16	0.10
Entrepreneurial team size	0.00	0.04	0.00	0.04	0.11	0.04	0.10*	0.04	0.02	0.07
Measurement wave	0.02	0.01	0.02	0.01	0.03**	0.01	0.03**	0.01	-0.03[†]	0.02
Entrepreneurial success					0.49**	0.04	0.45**	0.04	0.37**	0.06
Entrepreneurial self-efficacy	0.46**	0.04	0.44**	0.04						
Main effects										
Feelings of entrepreneurial passion			0.09*	0.04			0.10**	0.04	0.07	0.05
Entrepreneurial self-efficacy									0.29**	0.07
Deviance (-2LogLikelihood)	647.46		646.43		1300.92		1298.93		784.91	

Note. Model 1 and Model 2: Number of teams = 33. Number of participants = 165. Number of observations = 325. Model 3 and Model 4: Number of teams = 34. Number of participants = 180. Number of observations = 544. Model 5: Number of teams = 34. Number of participants = 159. Number of observations = 316. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [†] $p < .10$, * $p < .05$, ** $p < .01$.

To test Hypothesis 5, which states that entrepreneurial success has a positive effect on feelings of entrepreneurial passion, we conducted a linear mixed-effects model with entrepreneurial success as the predictor and feelings of entrepreneurial passion in the subsequent week as the dependent variable. We found a significant positive effect of entrepreneurial success on feelings of entrepreneurial passion (b = 0.32, SE = 0.05, $t(154)$ = 6.17, $p < .01$, see Model 4 of Table 3.4), which provides evidence for Hypothesis 5.

Hypothesis 6 suggests that the effect of entrepreneurial success on feelings of entrepreneurial passion is mediated by entrepreneurial self-efficacy. Entrepreneurial success had a significant positive effect on entrepreneurial self-efficacy (b = 0.23, SE = 0.04, $t(190)$ = 5.74, $p < .01$, see Model 2 of Table 3.4) which in turn had a positive and significant effect on feelings of entrepreneurial passion (b = 0.30, SE = 0.07, $t(123)$ = 4.43, $p < .01$, see Model 5 of Table 3.4). Using 20,000 replications, the Monte Carlo method showed that the indirect effect of entrepreneurial success on feelings of entrepreneurial passion through entrepreneurial self-efficacy was significant at a 95% confidence interval (indirect effect = .07, $p < .05$), providing empirical support for Hypothesis 6.

Table 3.4

Study 1: Results from Random Coefficient Modeling testing the Direct and Indirect Effect of Entrepreneurial Success on Feelings of Entrepreneurial Passion through Entrepreneurial Self-efficacy

	Entrepreneurial self-efficacy (lagged)				**Feelings of entrepreneurial passion (lagged)**					
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables										
Gender [a]	-0.22*	0.09	-0.10	0.09	-0.17	0.14	0.02	0.13	-0.09	0.13
Entrepreneurial experience [b]	0.14†	0.07	0.14*	0.07	0.15	0.11	0.15	0.10	0.12	0.10
Entrepreneurial team size	-0.02	0.04	-0.06†	0.04	0.05	0.07	0.04	0.06	0.04	0.06
Measurement wave	0.03*	0.01	0.03*	0.01	-0.02	0.02	-0.03	0.02	-0.06**	0.02
Feelings of entrepreneurial passion					0.18**	0.05	0.15**	0.05	0.06	0.05
Entrepreneurial self-efficacy	0.45**	0.04	0.38**	0.04						
Main effects										
Entrepreneurial success			0.23**	0.04			0.32**	0.05	0.29**	0.06
Entrepreneurial self-efficacy									0.30**	0.07
Deviance (-2LogLikelihood)	763.88		736.74		830.96		799.69		669.37	

Note. Model 1 and Model 2: Number of teams = 34. Number of participants = 169. Number of observations = 362. Model 3 and Model 4: Number of teams = 34. Number of participants = 159. Number of observations = 316. Model 5: Number of teams = 34. Number of participants = 154. Number of observations = 281. The results of Model 1 in Tables 3.3 and 3.4 differ from each other due to different numbers of observations included in the models. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. † $p < .10$, * $p < .05$, ** $p < .01$.

3.5 Study 1: Discussion

The results of Study 1 support our theoretical model. In particular, the findings provide empirical evidence for a reciprocal relationship between feelings of entrepreneurial passion and entrepreneurial success over time with entrepreneurial self-efficacy mediating the effects in both directions. While the cross-lagged design of the study allowed us to rigorously test these relations (Finkel, 1995; Lian et al., 2014), it is important to note that we conducted the study with students in the context of an entrepreneurship training which may have limited the generalizability of our results. To provide generalizable and theoretically relevant conclusions, empirical findings should be replicated in further studies based on different samples and different settings (Bettis, Ethiraj, Gambardella, Helfat, & Mitchell, 2016; Eden, 2002; Open Science Collaboration, 2015). We thus conducted Study 2 using a repeated measures design with business owners over three weeks. The first purpose of Study 2 was to replicate the results of Study 1. The second purpose of Study 2 was to extend the findings of Study 1 by investigating the moderating role of entrepreneurial identity centrality in the relationship between feelings of entrepreneurial passion, self-efficacy, and success.

3.6 Study 2: Methods

3.6.1 Sample

The sample comprised 65 business owners who had founded and managed their business in Dar es Salaam, Tanzania. The sample size is in line with past entrepreneurship research using repeated measures designs (Foo et al., 2009; Gielnik, Spitzmuller, et al., 2015). To be included in the sample, participants had to fulfill the following criteria. First, they must have started their business themselves and had to run the business as general manager or chief executive officer. Second, participants had to work on the business during the three weeks of our study. Third, they had to possess a sufficient command of English and demonstrate complete comprehension of the instructions at the first measurement wave. We recruited the participants through two lists of business owners provided by University of Dar es Salaam and an entrepreneurship hub in Dar es Salaam. Additionally, we employed a snowball approach and asked participants to introduce further business owners to us. This resulted in a total number of 369 potential participants who were contacted via email or

phone calls. In total, 68 business owners were eligible for participation and agreed to take part in the study, leading to a response rate of 18.4%. This response rate is in line with past studies using similar samples of business owners (e.g., Gadenne, 1998; Hmieleski & Baron, 2009; Keh et al., 2007; Murnieks et al., 2014; Runyan, Droge, & Swinney, 2008). Out of the 68 participants, two (2.9%) participants dropped out in the course of the study and were excluded from the analyses. In addition, we had to exclude one (1.5%) participant who did not read the instructions and questionnaire properly, resulting in a final sample of 65 participants (95.6% of our initial sample of 68 participants).

Of the final sample, 34 (52.3%) participants were male. Participants ranged in age from 22 to 65 years with an average age of 38.03 years (*SD* = 11.46). The majority of participants (58.5%) held a university degree, 29.2% held a diploma, 4.5% had a certificate, 6.1% had completed secondary school education, and 1.5% had completed primary school. Most (52.3%) participants had started another business before. On average, they had started 1.91 businesses (*SD* = 1.27) and had been managing the current business for 5.48 years (*SD* = 5.59). The businesses ranged in size from 0 to 40 full-time employees (*M* = 4.03; *SD* = 6.39). On average, the businesses generated 19,809,973.11 Tanzania Shilling sales per month (approximately 9,364.20 USD). The businesses came from various industries: 50.8% were in the service sector, 24.6% were in the wholesale and retail trade sector, 10.8% represented agriculture, forestry and fishing, 7.7% represented manufacturing, 4.6% represented transportation and public utilities, and 1.5% represented finance, insurance, and real estate.

At the beginning of the study, participants were informed on the procedure, the benefits, and the voluntary nature of participating in the study, the use of their data in research, and their right to withdraw from the study at any time. All participants were assured of strict confidentiality. In return for participating in our study, each participant received a benchmark report on his or her study outcomes and a certificate on study participation.

3.6.2 Study Design and Procedure

We employed a repeated measures design with three measurement waves (T1-T3) and a time lag of one week between each measurement wave. At each measurement wave, we visited the participants at their offices or workshops to collect data. At T1, we collected data on demographic and control variables using structured face-to-face interviews. The interviews were conducted by two research assistants who had received interviewer training

on interview techniques, note taking, and typical interviewer errors. After the interview, participants completed a questionnaire on feelings of entrepreneurial passion, entrepreneurial self-efficacy, entrepreneurial success, and entrepreneurial identity centrality. At T2 and T3, participants completed the same items on feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success. We ascertained feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success at each measurement wave. Our study design thus corresponds to a fully cross-lagged design. In our final sample, all 65 participants took part in three measurement waves, resulting in 195 observations.

3.6.3 Measures

Feelings of entrepreneurial passion. We ascertained feelings of entrepreneurial passion at T1, T2, and T3 using seven items from Cardon et al.'s (2013) measure. In line with Study 1, we used items from the passion for inventing and passion for founding scales. For each scale, we adopted the items that captured an entrepreneur's intense positive feelings toward the activity. Sample items include "*It is exciting to figure out new ways to solve unmet market needs that can be commercialized*" and "*Nurturing a new business through its emerging success is enjoyable*". Participants answered all items on a 7-point answer scale anchoring from 1 (*not at all*) to 7 (*absolutely*). We computed the mean over the seven items to create our measure of feelings of entrepreneurial passion. Mean Cronbach's Alpha (α = .81) over all three measurement waves demonstrated good internal consistency.

Entrepreneurial success. We measured entrepreneurial success at T1, T2, and T3. In line with Study 1, we used a subjective measure capturing an entrepreneur's progress and performance as a business owner (Olsen & Kolvereid, 1994; Venkatraman & Ramanujam, 1986). We used three items adapted from Liden, Wayne, and Stilwell's (1993) measure. All items started with the stem "*In the last week*" followed by the following statements: "*I performed very well as a business owner*", "*my performance as a business owner was high*", and "*I have successfully fulfilled my roles and responsibilities as a business owner*". Participants provided their answers on a 7-point response scale from 1 (*not at all*) to 7 (*absolutely*). The mean of the three items formed the score for entrepreneurial success (mean Cronbach's Alpha = .88). To validate the self-report measure of entrepreneurial success, we also ascertained the profit that the participants made with their business during our study. Analyses revealed a positive and significant correlation (r = .30, p < .05) between the self-

report measure over the three measurement waves and the profit gained during the three weeks, representing a large effect and thus providing evidence for the validity of the self-report measure (Bosco et al., 2015). The large effect is remarkable given the different dimensions of performance that are comprised by objective and subjective measures of entrepreneurial success (Olsen & Kolvereid, 1994; Venkatraman & Ramanujam, 1986).

Entrepreneurial self-efficacy. To assess entrepreneurial self-efficacy at T1, T2, and T3, we used 10 items based on Krauss' (2003) scale. Krauss (2003) developed the scale to assess existing entrepreneurs' entrepreneurial self-efficacy according to Bandura's (1989) conceptualization of self-efficacy. Past research has confirmed the scale's predictive validity for entrepreneurs in African settings (Frese, Krauss, et al., 2007). In line with Bandura's (1989) notion to measure self-efficacy task-specifically, the items referred to tasks and activities that are specifically related to entrepreneurship. All items started with the stem "*How confident are you that you can*" followed by specific entrepreneurial activities that are relevant throughout the entrepreneurial process such as "*negotiate with fellow business men well*" and "*do the pricing of your products well*". Participants answered all items on a 7-point answer scale ranging from 1 (*20%*) to 7 (*100%*). We computed the mean over the 10 items to create a scale of entrepreneurial self-efficacy (mean Cronbach's Alpha = .86).

Entrepreneurial identity centrality. We ascertained entrepreneurial identity centrality separately from feelings of entrepreneurial passion because our theoretical model addresses relatively fast change processes and thus requires disentangling entrepreneurial passion into fast changing feelings of entrepreneurial passion and relatively stable entrepreneurial identity centrality. We measured entrepreneurial identity centrality at T1. We used four items that were developed by Callero (1985) and that have been adapted to the entrepreneurship context (Cardon et al., 2013; Farmer, Yao, & Kung-Mcintyre, 2011; Murnieks et al., 2011, 2014). The items were "*Being an entrepreneur is an important part of who I am*", "*Being an entrepreneur is something I frequently think about*", "*For me, being an entrepreneur means more than just running my business*", and "*I see myself as an entrepreneur*". We used a 7-point response scale from 1 (*not at all*) to 7 (*absolutely*) for responses. The mean of the four items formed our measure of entrepreneurial identity centrality (Cronbach's Alpha = .68).

Control variables. We used gender, entrepreneurial experience, and entrepreneurship education as control variables. We assessed all control variables in the interview at T1. In line with Study 1, we controlled for gender (0 = *female*, 1 = *male*) and entrepreneurial experience

because these factors affect feelings of entrepreneurial passion, self-efficacy, and success (e.g., Bates, 2002; Cardon et al., 2013; Davidsson & Honig, 2003; Wilson et al., 2007; Zhao et al., 2005). We assessed entrepreneurial experience by asking participants for the number of businesses they had ever started (Schenkel, Hechavarria, & Matthews, 2009). We controlled for entrepreneurship education because entrepreneurship education is an important predictor of entrepreneurs' success (Martin, McNally, & Kay, 2013). To ascertain entrepreneurship education, we asked participants whether they had ever received an entrepreneurship or business training (0 = *no*, 1 = *yes*). We further included the measurement wave as control variable in our statistical analyses to control for possible learning or trend effects.

3.6.4 Method of Analysis

Our data were multiple observations (level 1) nested in individuals (level 2). To account for the nested data structure, we used random coefficient modeling (Bryk & Raudenbush, 1992; Ployhart & Vandenberg, 2010). As input for random coefficient modeling, we created a two-level hierarchical data structure with the repeated measures variables on level 1 and all other variables on level 2. Similar to Study 1, we created a lagged version of each repeated measures variable which represented the level of the respective variable one measurement wave later. We conducted the random coefficient modeling analyses using the package nlme (Pinheiro et al., 2014) included in R (R Core Team, 2014). We computed linear mixed-effects models using restricted maximum likelihood estimation (Bliese & Ployhart, 2002). In all models, we treated the effect of the individual as random intercept. We modelled the effect of feelings of entrepreneurial passion as random effect in all models testing Hypotheses 1 to 4. There was a time lag of one week between the predictor and dependent variables in all models. We controlled for prior levels of the dependent variable in all models in order to model autoregression and thus change rather than absolute levels of the dependent variable. This allowed us drawing stronger conclusions of causality (Ployhart et al., 2009).

3.7 Study 2: Results

3.7.1 Preliminary Analyses

Tables 3.5 and 3.6 show the descriptive statistics and correlations of all variables on level 1 and level 2, respectively. Multicollinearity was not a serious problem in this study, given that all VIF scores were below 2.5 (Allison, 1999). Our repeated measures variables displayed substantial variance within individuals over time with 30% of the total variance in feelings of entrepreneurial passion, 26% of the total variance in entrepreneurial self-efficacy, and 58% of the total variance in entrepreneurial success residing within persons. In line with Study 1, we performed confirmatory factor analyses for each pair of variables and each measurement wave. Analyses revealed that the hypothesized two-factor model fitted the data significantly better than the one-factor model in each case (minimum Chi^2-difference (1) = 62.01, $p < .01$), which provides evidence that our study variables represented distinct factors.

Table 3.5

Study 2: Means, Standard Deviations, and Correlations of Study Variables on Level 1 (Level of Observations)

	M	*SD*	1	2	3	4	5	6	7	8
1. Entrepreneurial self-efficacy T1	5.69	0.59	–							
2. Entrepreneurial self-efficacy T2	5.61	0.64	.77**	–						
3. Entrepreneurial self-efficacy T3	5.63	0.71	.71**	.76**	–					
4. Feelings of entrepreneurial passion T1	6.08	0.67	.39**	.35**	.28*	–				
5. Feelings of entrepreneurial passion T2	5.98	0.76	.34**	.34**	.28*	.71**	–			
6. Feelings of entrepreneurial passion T3	5.98	0.80	.46**	.43**	.49**	.68**	.74**	–		
7. Entrepreneurial success T1	4.80	1.49	.20	.32**	.16	.17	.22†	.06	–	
8. Entrepreneurial success T2	5.06	1.14	.35**	.34**	.35**	.31**	.18	.32**	.33**	–
9. Entrepreneurial success T3	4.94	1.39	.24†	.33**	.46**	.28*	.25*	.36**	.42**	.54**

Note. $N = 65$. $^{\dagger}p < .10$, * $p < .05$, ** $p < .01$.

Table 3.6

Study 2: Means, Standard Deviations, and Correlations of Study Variables on Level 2 (Individual Level)

	M	*SD*	1	2	3	4	5	6
1. Gender [a]	0.52	0.50	–					
2. Entrepreneurial experience	1.91	1.27	.08	–				
3. Entrepreneurship education [b]	0.89	0.31	.07	-.06	–			
4. Entrepreneurial identity centrality	6.54	0.51	-.03	.09	-.07	–		
5. Entrepreneurial self-efficacy	5.65	0.59	-.08	-.17	-.19	.29*	–	
6. Feelings of entrepreneurial passion	6.01	0.67	.09	.15	-.04	.42**	.46**	–
7. Entrepreneurial success	4.93	1.06	-.23†	.10	-.07	.18	.42**	.33**

Note. N = 65 participants. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. † $p < .10$, * $p < .05$, ** p < .01.

3.7.2 Hypothesis Testing

To test Hypothesis 1 on feelings of entrepreneurial passion having a positive effect on entrepreneurial success we calculated a linear mixed-effects model with feelings of entrepreneurial passion as predictor variable and entrepreneurial success in the subsequent week as dependent variable. As shown in Model 5 of Table 3.7, feelings of entrepreneurial passion had a positive and significant effect on entrepreneurial success (b = 0.43, SE = 0.18, $t(62) = 2.45$, $p < .05$) providing empirical evidence for Hypothesis 1.

Hypothesis 2 posits that the effect of feelings of entrepreneurial passion on entrepreneurial success is mediated by entrepreneurial self-efficacy. To test this hypothesis, we ran a linear mixed-effects model regressing entrepreneurial self-efficacy on prior feelings of entrepreneurial passion and a linear mixed-effects model regressing entrepreneurial success on prior entrepreneurial self-efficacy and feelings of entrepreneurial passion. Table 3.7 provides the results. Contrary to expectations, feelings of entrepreneurial passion did not have a significant effect on entrepreneurial self-efficacy (b = 0.03, SE = 0.06, $t(62) = 0.57$, *ns*, see Model 2) which is inconsistent with a mediation effect and thus contradicts Hypothesis 2.

Hypothesis 3 states that the effect of feelings of entrepreneurial passion on entrepreneurial success is moderated by entrepreneurial identity centrality. We tested this hypothesis by calculating a linear mixed-effects model regressing entrepreneurial success on the interaction between feelings of entrepreneurial passion and entrepreneurial identity

centrality. Following Aiken and West (1991), we entered the control variables in step 1, the main effects of feelings of entrepreneurial passion and entrepreneurial identity centrality in step 2, and the interaction term between feelings of entrepreneurial passion and entrepreneurial identity centrality in step 3. Prior to model estimation, we mean-centered the predictor and moderator variables to ease interpretation of regression coefficients (Preacher, Curran, & Bauer, 2006). As shown in Model 6 of Table 3.7, the interaction effect between feelings of entrepreneurial passion and entrepreneurial identity centrality on entrepreneurial success was positive and significant (b = 0.85, SE = 0.37, $t(61)$ = 2.31, $p < .05$). To test whether the significant interaction effect was consistent with the hypothesized pattern, we conducted simple slope analyses for multilevel data (Preacher et al., 2006). We regressed entrepreneurial success on feelings of entrepreneurial passion for low levels of entrepreneurial identity centrality (i.e., one standard deviation below the mean) and high levels of entrepreneurial identity centrality (i.e., one standard deviation above the mean). The results are illustrated in Figure 3.2. As expected, the relationship between feelings of entrepreneurial passion and entrepreneurial success was positive and significant in case of high entrepreneurial identity centrality (t = 3.26, $p < .01$). The relationship between feelings of entrepreneurial passion and entrepreneurial success was weaker and non-significant in case of low entrepreneurial identity centrality (t = 0.30, *ns*). Altogether, these findings support Hypothesis 3: Entrepreneurial identity centrality moderates the effect of feelings of entrepreneurial passion on entrepreneurial success insofar as the positive effect of feelings of entrepreneurial passion on entrepreneurial success is stronger in case of high entrepreneurial identity centrality compared to low entrepreneurial identity centrality.

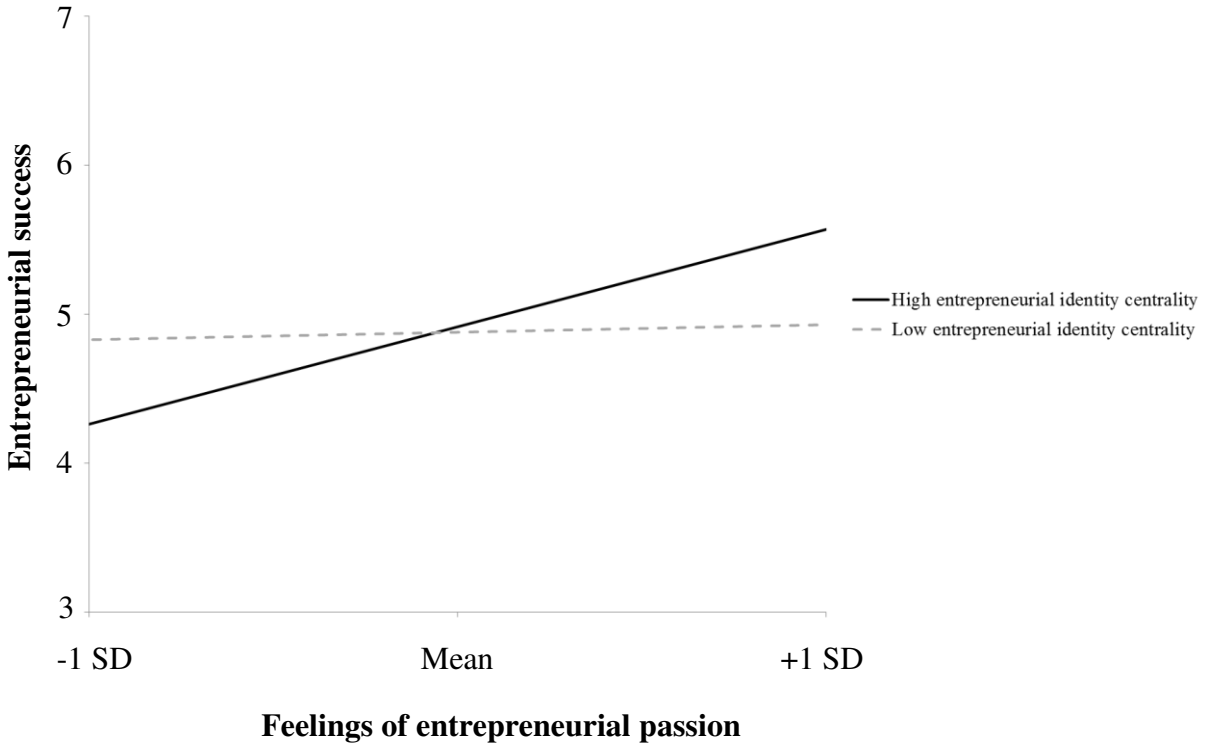


Figure 3.2. Study 2: Simple Slopes for the Effect of Feelings of Entrepreneurial Passion on Entrepreneurial Success for Low Levels of Entrepreneurial Identity Centrality (i.e., One Standard Deviation Below the Mean) and High Levels of Entrepreneurial Identity Centrality (i.e., One Standard Deviation Above the Mean)

According to Hypothesis 4, the moderating effect of entrepreneurial identity centrality on the effect of feelings of entrepreneurial passion on entrepreneurial success is mediated by entrepreneurial self-efficacy. This hypothesis corresponds to a mediated moderation model (Muller et al., 2005). To test for a mediated moderation model, we followed the statistical procedure described by Muller et al. (2005) positing that three conditions must be satisfied to establish mediated moderation. First, the interaction effect between the predictor and the moderator on the dependent variable must be significant indicating an overall moderation effect. We proved this condition to be true when testing Hypothesis 3: There was a significant interaction effect between feelings of entrepreneurial passion and entrepreneurial identity centrality on entrepreneurial success. Second, there must be a significant interaction effect between the predictor and the moderator on the mediating variable. To test this condition, we conducted a linear mixed-effects model regressing entrepreneurial self-efficacy on the

interaction between feelings of entrepreneurial passion and entrepreneurial identity centrality. We entered the control variables in step 1, the main effects of feelings of entrepreneurial passion and entrepreneurial identity centrality in step 2, and the interaction term between feelings of entrepreneurial passion and entrepreneurial identity centrality in step 3 (Aiken & West, 1991). We mean-centered the predictor and moderator variables prior to model estimation (Preacher et al., 2006). Results showed that the interaction term between feelings of entrepreneurial passion and entrepreneurial identity centrality on entrepreneurial self-efficacy was positive and significant (b = 0.30, SE = 0.13, $t(61) = 2.30$, $p < .05$, see Model 3 of Table 3.7). We further investigated the interaction effect by employing simple slope analyses (Preacher et al., 2006). Figure 3.3 displays the simple slopes for low entrepreneurial identity centrality (i.e., one standard deviation below the mean) and high entrepreneurial identity centrality (i.e., one standard deviation above the mean). In line with the hypothesized pattern, the simple slopes were positive and significant for high entrepreneurial identity centrality (t = 2.25, $p < .05$). The simple slopes were weaker and non-significant for low entrepreneurial identity centrality (t = -0.80, *ns*). These findings confirm the second condition. Third, there must be a significant effect of the mediator on the dependent variable when the predictor, the moderator, and the interaction terms between the predictor and the moderator as well as between the mediator and the moderator are controlled. To demonstrate that this condition holds, we computed a linear-mixed effects model regressing entrepreneurial success on prior entrepreneurial self-efficacy while controlling for feelings of entrepreneurial passion, entrepreneurial identity centrality, the interaction between feelings of entrepreneurial passion and entrepreneurial identity centrality, and the interaction between entrepreneurial self-efficacy and entrepreneurial identity centrality. Analyses revealed that entrepreneurial self-efficacy had a significant and positive effect on entrepreneurial success (b = 0.50, SE = 0.21, $t(59) = 2.34$, $p < .05$, see Model 8 of Table 3.7). In addition, the interaction effect between feelings of entrepreneurial passion and entrepreneurial identity centrality became smaller and non-significant in this model (b = 0.59, SE = 0.42, $t(59) = 1.42$, *ns*). This indicates that the interaction effect between feelings of entrepreneurial passion and entrepreneurial identity centrality on entrepreneurial success was fully mediated by entrepreneurial self-efficacy (Muller et al., 2005). Following Morgan-Lopez and MacKinnon (2006), we estimated the mediated moderation effect by multiplying the interaction effect between feelings of entrepreneurial passion and entrepreneurial identity centrality on

entrepreneurial self-efficacy with the effect of entrepreneurial self-efficacy on entrepreneurial success. Using 20,000 replications, the Monte Carlo method (MacKinnon et al., 2004) showed that the mediated moderation effect was significant (mediated moderation effect = .14, $p < .05$). Altogether, these results support Hypothesis 4 that the moderating effect of entrepreneurial identity centrality on the effect of feelings of entrepreneurial passion on entrepreneurial success is mediated through entrepreneurial self-efficacy.

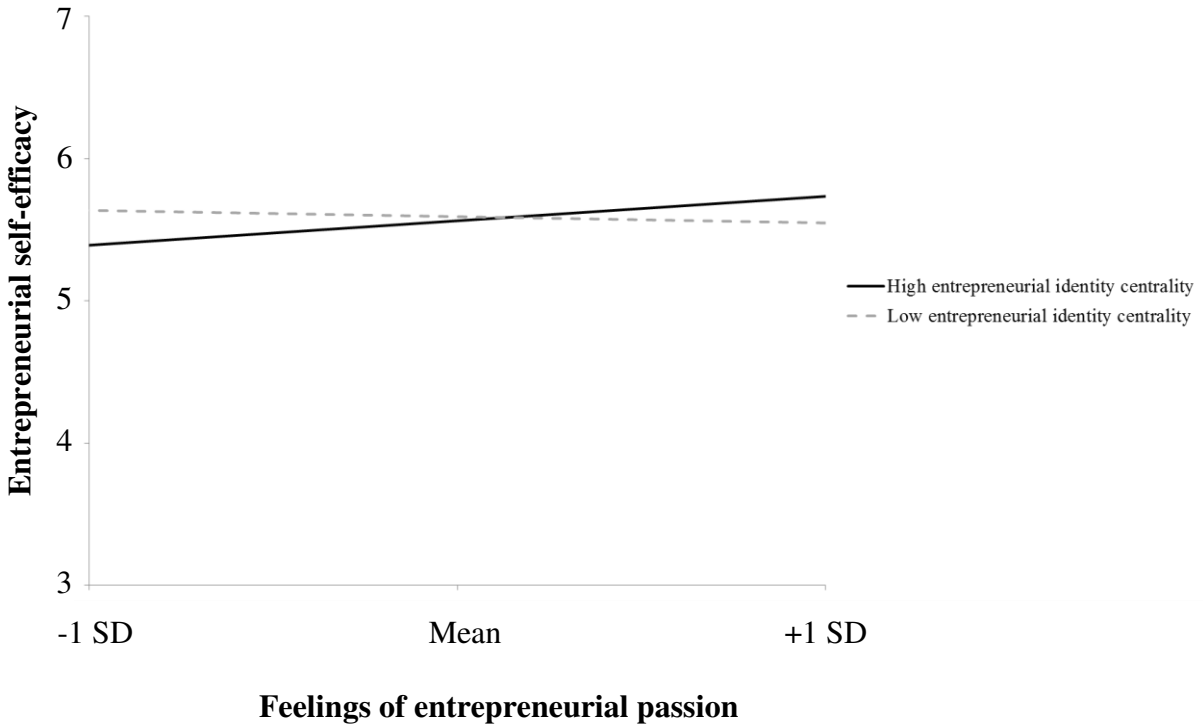


Figure 3.3. Study 2: Simple Slopes for the Effect of Feelings of Entrepreneurial Passion on Entrepreneurial Self-Efficacy for Low Levels of Entrepreneurial Identity Centrality (i.e., One Standard Deviation Below the Mean) and High Levels of Entrepreneurial Identity Centrality (i.e., One Standard Deviation Above the Mean)

Table 3.7

Study 2: Results from Random Coefficient Modeling testing the Direct and Indirect Effect of Feelings of Entrepreneurial Passion on Entrepreneurial Success through Entrepreneurial Self-efficacy and the Moderating Effect of Entrepreneurial Identity Centrality

	Entrepreneurial self-efficacy (lagged)						**Entrepreneurial Success (lagged)**									
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables																
Gender [a]	0.09	0.08	0.08	0.08	0.04	0.08	-0.37	0.24	-0.43†	0.23	-0.54*	0.24	-0.41†	0.23	-0.53*	0.25
Entrepreneurial experience	-0.01	0.03	-0.01	0.03	-0.02	0.03	0.08	0.09	0.02	0.09	0.04	0.09	0.09	0.09	0.10	0.10
Entrepreneurship education [b]	-0.03	0.13	-0.03	0.13	-0.01	0.13	-0.05	0.38	-0.13	0.39	-0.01	0.38	-0.01	0.39	0.08	0.39
Measurement wave	0.08	0.08	0.08	0.08	0.08	0.08	-0.17	0.18	-0.11	0.17	-0.10	0.17	-0.06	0.16	-0.05	0.16
Entrepreneurial success							0.22**	0.08	0.18*	0.08	0.16*	0.08	0.12	0.08	0.10	0.08
Entrepreneurial self-efficacy	0.84**	0.07	0.82**	0.07	0.77**	0.08										
Main effects																
Feelings of entrepreneurial passion			0.03	0.06	0.09	0.07			0.43*	0.18	0.50**	0.18	0.25	0.19	0.31	0.20
Entrepreneurial identity centrality					-0.03	0.09					0.04	0.24			-0.01	0.25
Entrepreneurial self-efficacy													0.53**	0.20	0.50*	0.21
Interaction effects																
Feelings of entrepreneurial passion x Entrepreneurial identity centrality					0.30*	0.13					0.85*	0.37			0.59	0.42
Entrepreneurial self-efficacy x Entrepreneurial identity centrality															0.23	0.36
Deviance (-2LogLikelihood)	172.61		176.04		175.97		411.92		403.65		399.67		398.30		395.97	

Note. Number of participants = 65. Number of observations = 130. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. † $p < .10$, * $p < .05$, ** $p < .01$.

To test Hypothesis 5, that entrepreneurial success has a positive effect on feelings of entrepreneurial passion, we conducted a linear mixed-effects model with entrepreneurial success as the predictor and feelings of entrepreneurial passion in the following week as the dependent variable. Entrepreneurial success had a significant positive effect on feelings of entrepreneurial passion ($b = 0.09$, $SE = 0.04$, $t(62) = 2.47$, $p < .05$, see Model 4 of Table 3.8).

Hypothesis 6 posits that the effect of entrepreneurial success on feelings of entrepreneurial passion is mediated by entrepreneurial self-efficacy. Entrepreneurial success had a significant positive effect on entrepreneurial self-efficacy ($b = 0.08$, $SE = 0.03$, $t(62) = 2.68$, $p < .01$, see Model 2 of Table 3.8) which in turn had a significant positive effect on feelings of entrepreneurial passion ($b = 0.18$, $SE = 0.09$, $t(61) = 2.05$, $p < .05$, see Model 5 of Table 3.8). Based on 20,000 replications, the Monte Carlo method (MacKinnon et al., 2004) showed a significant indirect effect of entrepreneurial success on feelings of entrepreneurial passion through entrepreneurial self-efficacy (indirect effect = .01, $p < .05$), supporting Hypothesis 6.

Table 3.8

Study 2: Results from Random Coefficient Modeling testing the Direct and Indirect Effect of Entrepreneurial Success on Feelings of Entrepreneurial Passion through Entrepreneurial Self-efficacy

	Entrepreneurial self-efficacy (lagged)				**Feelings of entrepreneurial passion (lagged)**					
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables										
Gender [a]	0.09	0.08	0.13	0.08	0.06	0.10	0.11	0.10	0.13	0.10
Entrepreneurial experience	-0.01	0.03	-0.02	0.03	0.00	0.04	0.00	0.04	0.02	0.04
Entrepreneurship education [b]	-0.03	0.13	-0.04	0.13	0.03	0.15	0.04	0.15	0.10	0.15
Measurement wave	0.08	0.08	0.06	0.08	0.08	0.10	0.06	0.09	0.07	0.09
Feelings of entrepreneurial passion					0.78**	0.07	0.75**	0.07	0.69**	0.07
Entrepreneurial self-efficacy	0.84**	0.07	0.79**	0.07						
Main effects										
Entrepreneurial success			0.08**	0.03			0.09*	0.04	0.08*	0.04
Entrepreneurial self-efficacy									0.18*	0.09
Deviance (-2LogLikelihood)	172.61		170.73		224.96		223.71		222.56	

Note. Number of participants = 65. Number of observations = 130. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. * $p < .05$, ** $p < .01$.

3.7.3 Supplemental Analysis

In contrast to expectations and to the results of Study 1, Study 2 did not reveal a significant main effect of feelings of entrepreneurial passion on entrepreneurial self-efficacy and thus could not support a general mediation effect of entrepreneurial self-efficacy on the link from feelings of entrepreneurial passion to entrepreneurial success. However, Study 2 showed a significant positive effect of feelings of entrepreneurial passion on entrepreneurial self-efficacy in case of high levels of entrepreneurial identity centrality. These results suggest that there is a mediation effect of entrepreneurial self-efficacy on the link from feelings of entrepreneurial passion to entrepreneurial success in case of high entrepreneurial identity centrality. To test this assumption, we computed conditional indirect effects (Preacher, Rucker, & Hayes, 2007) for high entrepreneurial identity centrality (i.e., one standard deviation above the mean) and low entrepreneurial identity centrality (i.e., one standard deviation below the mean). To calculate the conditional indirect effects, we followed the procedure described by past research (Muller et al., 2005; Tein, Sandler, MacKinnon, & Wolchik, 2004). We computed a linear mixed-effects model regressing entrepreneurial self-efficacy on the interaction between prior feelings of entrepreneurial passion and high entrepreneurial identity centrality and a linear mixed-effects model regressing entrepreneurial success on prior entrepreneurial self-efficacy and the interaction between feelings of entrepreneurial passion and high entrepreneurial identity centrality. We then tested for mediation by conducting the Monte Carlo method (MacKinnon et al., 2004) using 20,000 replications. Analyses revealed a significant indirect effect of feelings of entrepreneurial passion on entrepreneurial success through entrepreneurial self-efficacy for high levels of entrepreneurial identity centrality (conditional indirect effect = .11, $p < .05$). We applied the same procedure for low levels of entrepreneurial identity centrality and found a smaller, non-significant indirect effect of feelings of entrepreneurial passion on entrepreneurial success through entrepreneurial self-efficacy for low entrepreneurial identity centrality (conditional indirect effect = -.03, *ns*). These results indicate that entrepreneurial self-efficacy mediates the effect of feelings of entrepreneurial passion on entrepreneurial success in case of high entrepreneurial identity centrality but not in case of low entrepreneurial identity centrality.

3.8 Study 2: Discussion

The results of Study 2 replicate and extend the findings of Study 1. In line with Study 1, Study 2 provides evidence for a reciprocal relationship between feelings of entrepreneurial passion and entrepreneurial success. Beyond that, Study 2 extends the results of Study 1 by shedding light on the moderating role of entrepreneurial identity centrality in this relationship. In particular, Study 2 shows that feelings of entrepreneurial passion have a stronger positive effect on entrepreneurial success if entrepreneurial identity centrality is high. Study 2 further reveals that entrepreneurial self-efficacy mediates the effect of feelings of entrepreneurial passion on success only if entrepreneurial identity centrality is high. Thus, Study 2 furthers our understanding of the reciprocal relationship between feelings of entrepreneurial passion and entrepreneurial success by investigating an important boundary condition of the effects of feelings of entrepreneurial passion on entrepreneurial self-efficacy and entrepreneurial success.

3.9 General Discussion

Scholars agree that entrepreneurial passion is positively related to entrepreneurial self-efficacy and success. Yet, disagreement remains on the causal direction of these relationships. Different theoretical perspectives described passion either as a predictor or as an outcome of entrepreneurs' self-efficacy and success (e.g., Baum et al., 2001; Cardon et al., 2009; Dalborg & Wincent, 2014; Gielnik, Spitzmuller, et al., 2015; Murnieks et al., 2014). The apparent discrepancies and competing explanations of these perspectives leave our understanding of the links between entrepreneurial passion, self-efficacy, and success incomplete. The goal of this study was to advance our theoretical understanding by integrating the different fragmented frameworks into an integrated model of entrepreneurial passion. Building on the notion of reciprocal causation (Lindsley et al., 1995), we developed a theoretical model positing that the relations between feelings of entrepreneurial passion, self-efficacy, and success are reciprocal rather than unidirectional. Two longitudinal field studies with weekly measurements over 12 and three weeks provided evidence for our theoretical model. Our findings revealed a dynamic and reciprocal causative relationship between feelings of entrepreneurial passion and entrepreneurial success over time. Analyses further showed that entrepreneurial self-efficacy is a key mechanism explaining the

reciprocal effects in both directions. Entrepreneurial identity centrality strengthened the effects of feelings of entrepreneurial passion on entrepreneurial self-efficacy and entrepreneurial success. The results hold important theoretical implications.

3.9.1 Theoretical Implications

First, this research contributes to our theoretical understanding of entrepreneurial passion by integrating hitherto fragmented perspectives into a more integrated model. Our theoretical model and empirical evidence on the reciprocal relationships between feelings of entrepreneurial passion, self-efficacy, and success reconcile seemingly conflicting theoretical frameworks that have considered passion either as predictor or as outcome of entrepreneurs' self-efficacy and success. Moreover, our findings support the common yet often disregarded theoretical notion that motivational processes such as feelings of passion and self-efficacy follow a dynamic and reciprocal rather than static and unidirectional pattern (e.g., Lindsley et al., 1995; Lord et al., 2010). Future theoretical and empirical research may profit from taking the dynamic and reciprocal nature of such processes into account in order to fully understand the development and role of passion in entrepreneurship.

Second, our research adds to the literature on entrepreneurial passion by investigating dynamic changes in feelings of entrepreneurial passion over time. In our studies, a substantial amount of the variance in feelings of entrepreneurial passion was within-person variance. Our research thus provides empirical evidence that feelings of entrepreneurial passion are dynamic experiences that systematically vary within individuals over time (e.g., Cardon et al., 2013, 2009; Thorgren & Wincent, 2013). Understanding the dynamic nature of positive feelings inherent in passion may help to build theory on how passion changes and functions within entrepreneurs over time (Collewaert et al., 2016).

Third, we extend previous work on entrepreneurial passion by providing evidence for hitherto unexamined pathways leading to and from feelings of entrepreneurial passion. Our results show that entrepreneurial success has an indirect effect on feelings of entrepreneurial passion through raising one's entrepreneurial self-efficacy. This result expands Gielnik, Spitzmuller et al.'s (2015) theoretical notion on the success-to-passion link by identifying entrepreneurial self-efficacy as an important underlying mechanism. In addition, our research shows that feelings of entrepreneurial passion promote entrepreneurial success over a period of one week. This finding is in line with previous studies showing that entrepreneurial

passion predicts an entrepreneur's success over several months and years (Baum et al., 2001; Baum & Locke, 2004; Drnovsek et al., 2016). Whereas these studies have focused on long-term effects of passion, our research indicates that feelings of passion also directly impact entrepreneurial success one week later. We thus substantiate the predictive power of feelings of entrepreneurial passion for an entrepreneur's success over a short time period. Moreover, by disentangling entrepreneurial passion into its two dimensions of positive feelings and identity centrality, we illustrate how positive feelings and entrepreneurial identity centrality interact to induce the motivational effects of entrepreneurial passion. In line with Cardon et al.'s (2009) theory of entrepreneurial passion, our findings reveal that entrepreneurial identity centrality strengthens the effects of feelings of entrepreneurial passion on entrepreneurs' self-efficacy and success. Future research should thus consider the interactive effect of feelings of entrepreneurial passion and entrepreneurial identity centrality to better understand the potential impact of entrepreneurial passion (Collewaert et al., 2016).

3.9.2 Strengths and Limitations

Our studies use strong repeated measures designs. The repeated measurement of the study variables allowed us to uncover dynamic changes in feelings of entrepreneurial passion, entrepreneurial self-efficacy, and entrepreneurial success over time. Moreover, the cross-lagged study designs enabled us to examine how dynamic changes in these variables result from other variables, thereby providing a strong test of the directionality and reciprocity of effects (Finkel, 1995; Lian et al., 2014). We further replicated our empirical findings using two different samples in different settings which increases the generalizability and theoretical value of our results (Bettis et al., 2016; Eden, 2002; Open Science Collaboration, 2015). We thus contribute to the growing body of entrepreneurship research by rigorously testing our theoretical understanding of the dynamic processes leading to and from feelings of entrepreneurial passion (Bliese & Ployhart, 2002; Ployhart & Vandenberg, 2010).

Although the methodology is a major strength of our studies, our studies also show some measurement limitations. One important measurement limitation is that we assessed all study variables using self-reports. Self-reports generally run the risk to yield socially acceptable responses and to bias the results (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). While self-report measures of motivational processes such as entrepreneurial passion and self-efficacy are still valuable for providing unique access to such subjective experiences

(Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003), self-report measures of success have been criticized to lack validity. Specifically, self-reports of success have been questioned for assessing subjective rather than objective success. We concur, and acknowledge that our measures of entrepreneurial success capture entrepreneurs' perceived rather than objective success. However, there are two reasons why measuring entrepreneurs' perceived success was more adequate for our studies than assessing objective success. First, most of our participants were in early phases of the entrepreneurial process, in which financial outcomes are oftentimes not available and in which an entrepreneur's success is better reflected by subjective indicators such as his or her performance as a business owner and progress in starting a new venture (e.g., Baron, 2007; Olsen & Kolvereid, 1994; van Gelderen et al., 2005; Venkatraman & Ramanujam, 1986). Second, we built our theoretical model on social cognitive theory which posits that affective and cognitive experiences, such as feelings of passion and self-efficacy, depend on an individual's perceived success rather than objective success (Bandura & Locke, 2003; Bandura, 1991; Holland & Shepherd, 2013; Wanberg, Zhu, & Van Hooft, 2010; R. Wood & Bandura, 1989). Entrepreneurs' perceived success may differ from their objective success (Hsu, Wiklund, & Cotton, 2017). Accordingly, subjective measures of success seemed more appropriate to test our theoretical model than objective measures of success. Notwithstanding, we provided evidence that entrepreneurs' subjective success was significantly correlated with their profit, indicating that the two measures of success were closely related to each other.

Moreover, assessing all variables with self-reports could inflate the correlations among study variables due to common method variance (Podsakoff et al., 2003). Most problems associated with common method variance are resolved in our studies because we controlled for earlier levels of the dependent variable in all analyses and thus ruled out constant sources of common method variance such as negative affectivity and response biases (Frese, Garst, et al., 2007; Zapf, Dormann, & Frese, 1996). In addition, our results on the moderating effects of entrepreneurial identity centrality should not be affected by common method variance because interaction terms are not biased by common method variance when controlling for the main effects of the respective variables (Evans, 1985; Siemsen, Roth, & Oliveira, 2010).

We interpret the context of our studies as strength although some scientists may see it as a potential limitation. We conducted both studies in Tanzania. Tanzania is a low income country with a gross national income per capita of 930 USD (The World Bank, 2015). The

widespread poverty in Tanzania may diminish the generalizability of our findings toward other contexts. However, there are two reasons why limited generalizability may be less of a concern for our studies. First, we built our theoretical model on past research conducted in more developed countries (e.g., Gielnik, Spitzmuller, et al., 2015; Murnieks et al., 2011, 2014). These studies have led to similar results, indicating that our results are applicable to more developed countries as well. Second, it is important to keep in mind that people living in less developed countries such as Tanzania constitute the majority of the world population and thus represent an important population for management studies (Arnett, 2008; Reynolds, 2012). In fact, research needs to include people living in developing countries into the sample to be able to develop representative theories (Bruton, 2010). Against this background, scholars have explicitly called for adopting Africa as a research context in order to investigate and extend existing theoretical perspectives in the fields of management and entrepreneurship (G. George, Corbishley, Khayesi, Haas, & Tihanyi, 2016). Nevertheless, future research should replicate our findings with entrepreneurs in more developed countries.

3.9.3 Directions for Future Research

Our studies point to important avenues for future research. First, future research could extend our basic model by including further mechanisms that explain the relationship between feelings of entrepreneurial passion and entrepreneurial success. Our studies provide evidence for a reciprocal relationship between feelings of entrepreneurial passion and entrepreneurial success with entrepreneurial self-efficacy underlying the effects in both directions. While entrepreneurial self-efficacy explained a significant portion of the links between feelings of passion and success, the direct effect of feelings of entrepreneurial passion on entrepreneurial success and the direct effect of entrepreneurial success on feelings of entrepreneurial passion remained significant when accounting for the mediating effect of entrepreneurial self-efficacy. In addition, our results indicate that entrepreneurial self-efficacy explains the effect of feelings of entrepreneurial passion on entrepreneurial success only if entrepreneurial identity centrality is high. These findings suggest that there are also other processes than self-efficacy that mediate the passion-success link. Future studies may thus provide a more comprehensive examination of the mechanisms underlying the reciprocal relationship between feelings of entrepreneurial passion and entrepreneurial success.

Second, an important extension of this research would be to examine the temporal variation of the effect of feelings of entrepreneurial passion on entrepreneurial success. Our findings suggest that feelings of entrepreneurial passion have a positive impact on entrepreneurial success over a period of one week. However, scholars have noted that characteristics that vary substantially over time such as feelings of entrepreneurial passion may have low predictive validity over a longer period of time (Gielnik, Barabas, et al., 2014). Accordingly, feelings of entrepreneurial passion may exert a short-term effect on an entrepreneur's success that continuously wears off over time. However, current evidence only allows tentative assumptions that should be systematically investigated by future research. Specifically, future studies should examine the effect of feelings of entrepreneurial passion on entrepreneurial success over a longer period of time and specify the timeframe in which feelings of entrepreneurial passion predict subsequent entrepreneurial success. Such research would provide interesting insights into the temporality of the passion-to-success link and allow more precise conclusions regarding passion's predictive validity (Gielnik, Barabas, et al., 2014; T. R. Mitchell & James, 2001; Sturman, Cheramie, & Cashen, 2005).

3.9.4 Conclusion

Passionate entrepreneurs are more successful. To explain this phenomenon, scholars have mainly relied on unidirectional models that consider passion either as predictor or as outcome of an entrepreneur's success. Our research moves beyond these unidirectional models and provides a novel reciprocal perspective on the causal relationship between feelings of entrepreneurial passion and entrepreneurial success. Our findings reveal that the strong cross-sectional correlation between feelings of entrepreneurial passion and entrepreneurial success may be due to repeated cycles of feelings of entrepreneurial passion and entrepreneurial success experienced by the entrepreneur. Any interruption of this cycle, for instance due to temporary failure, may reduce the cross-sectional correlation. As such, the relationship between feelings of entrepreneurial passion and entrepreneurial success may wax and wane over time, leading to a much more dynamic perspective. Our results show that such a dynamic and reciprocal perspective is important to fully understand the role of passion in entrepreneurship. We hope that these findings will pave the way for future dynamic research that moves our understanding of passion in entrepreneurship further forward.

4. Keep the Straw Fire Burning: Investigating the Maintenance of Opportunity Identification after Entrepreneurship Training

Abstract

Entrepreneurship training theory has been restricted to a static view on training effects, neglecting whether, how, and on what conditions these effects hold over time. In this study, we adopt a more dynamic perspective on training effects and develop a theoretical model on the effect of entrepreneurship training on opportunity identification over time. Our theoretical model posits that entrepreneurship training has a positive short-term effect on opportunity identification which declines over time. We further propose that the decline in opportunity identification is prevented by participants' action planning and entrepreneurial action. We provide evidence for our theoretical model by conducting a randomized controlled field experiment with three measurement waves over 15 months. Our results suggest that positive effects of entrepreneurship training tend to quickly die away like a straw fire and that action-regulatory factors are important mechanisms sustaining the positive effects over time.

Keywords: Entrepreneurship, training, opportunity identification, action planning, action, time, maintenance

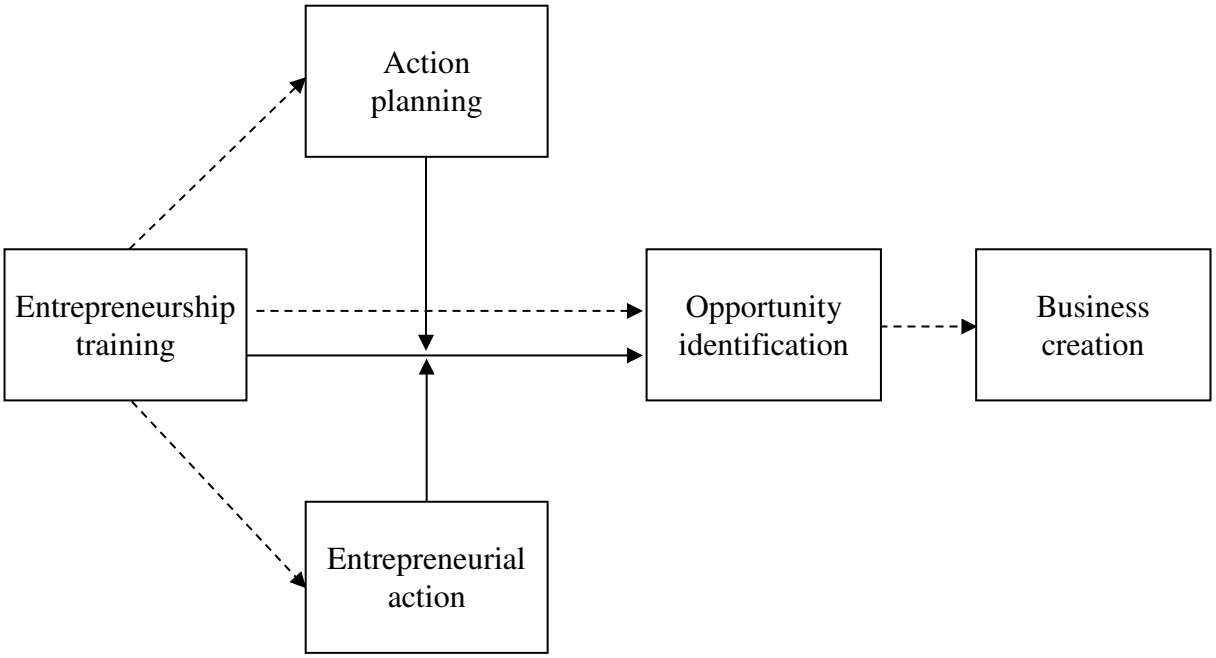
4.1 Introduction

Entrepreneurship trainings abound (B. C. Martin et al., 2013; Thrane, Blenker, Korsgaard, & Neergaard, 2016). Over the last decades, governments around the world have devoted substantial resources to entrepreneurship trainings in order to foster entrepreneurship and, thereby, economic growth (Glaub & Frese, 2011; Kuratko, 2005; Walter & Block, 2016). A recent meta-analysis provided evidence for the efficacy of such trainings by yielding positive effects of entrepreneurship training on business creation and business performance (B. C. Martin et al., 2013).

Although it is known that entrepreneurship training is effective to some extent, little is known about the mechanisms underlying those effects (Gielnik et al., 2017; Gielnik, Frese, et al., 2015; B. C. Martin et al., 2013; Neck & Greene, 2011; Pittaway & Cope, 2007). Understanding the underlying mechanisms of entrepreneurship training effects is a prerequisite to design effective entrepreneurship trainings and to invest resources wisely (Edelman, Manolova, & Brush, 2008; Fiet, 2001; Pittaway & Cope, 2007). Existing studies have thus aimed at uncovering such mechanisms by examining cognitive and motivational processes that may mediate entrepreneurship training effects (e.g., Gielnik, Frese, et al., 2015; Peterman & Kennedy, 2003; Rauch & Hulsink, 2015; Souitaris, Zerbinati, & Al-Laham, 2007). The underlying assumption of these studies is that entrepreneurship training stimulates cognitive and motivational outcomes in the short term which translate into more distal outcomes, such as business creation, in the long term (see Kraiger, Ford, & Salas, 1993). Although these studies offered valuable insights into potential mechanisms transmitting training effects, their theoretical conclusions and empirical results have been restricted to a relatively static view on training outcomes (Gielnik et al., 2017; Lorz et al., 2013). In fact, existing studies typically assessed cognitive and motivational outcomes at one time point soon after training, assuming that these outcomes remain stable over time. However, there is good reason to believe that cognitive and motivational processes triggered by entrepreneurship training change over time. For example, the literature on performance dynamics suggests that peoples' cognition and motivation are dynamic processes that vary considerably within persons over time (Lord et al., 2010; Sonnentag & Frese, 2009). Moreover, research on training transfer indicates that training outcomes generally decay over time (Baldwin & Ford, 1988; Blume, Ford, Baldwin, & Huang, 2010). Thus, research needs to move beyond the common static and short-term view toward a more dynamic and long-

term view on training outcomes in order to better understand how and under which conditions entrepreneurship training exerts its effects (Gielnik et al., 2017; Lorz et al., 2013).

Our study represents one of the first steps in this direction. In this study, we adopt a dynamic perspective on training effects and develop a theoretical model on the effect of entrepreneurship training on opportunity identification over time. We focus on opportunity identification as major training outcome because identifying opportunities has been recognized as one of "the most important abilities of a successful entrepreneur" (Ardichvili et al., 2003, p. 105), as the "major act in the entrepreneurial process" (Saks & Gaglio, 2002, p. 313) and, thus, as a central outcome of entrepreneurship training (DeTienne & Chandler, 2004; Saks & Gaglio, 2002). Integrating the extant literatures on entrepreneurship training and training transfer, our theoretical model posits that entrepreneurship training has a positive short-term effect on opportunity identification which declines over time. Moreover, building on the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987), we argue that the decline in opportunity identification is prevented by participants' action planning and entrepreneurial action after the training. This means that participants showing low action planning and entrepreneurial action after training decrease in opportunity identification over time, whereas participants high in action planning and entrepreneurial action maintain their increased level of opportunity identification in the long term. High opportunity identification predicts business creation (see Figure 4.1). We provide evidence for our theoretical model using a randomized controlled field experiment with a longitudinal pretest-posttest design and three measurement waves over 15 months. The design of our study represents the gold standard for testing causal training effects (Reay, Berta, & Kohn, 2009) and allows examining the maintenance of training effects over time. Our results indicate that positive effects of entrepreneurship training decay over time, but that action planning and entrepreneurial action can help sustaining these effects in the long term.



Note. Dashed lines represent short-term effects. Solid lines stand for long-term effects.

Figure 4.1. Theoretical Model on the Maintenance of Opportunity Identification

Our study aims at contributing to the literature on entrepreneurship training in three ways. First, our study enhances our theoretical understanding of entrepreneurship training effects by examining the maintenance of training effects over time. Our results reveal that the effect of entrepreneurship training on opportunity identification wears off over time. This suggests that the frequently demonstrated short-term effects of entrepreneurship training may reflect straw fire effects, i.e., short-term boosts that rapidly arise during the training and waste away just as rapidly after the training. Thus, our study shows that taking temporal dynamics of training effects into account is important to develop a solid entrepreneurship training theory and to draw valid conclusions from empirical results (Gielnik et al., 2017).

Second, our study identifies action planning and entrepreneurial action as mechanisms sustaining the effects of entrepreneurship training over time. These results add to our limited understanding of the conditions facilitating long-term effects of entrepreneurship training. Moreover, the results contribute to our knowledge on training transfer. Training transfer refers to the extent to which skills and behaviors acquired during the training are applied to other settings and maintained in those settings after training (Blume et al., 2010). The maintenance of training effects has been commonly reduced to participants' motivation (e.g.,

Baldwin et al., 2017; Baldwin & Ford, 1988; Blume et al., 2010; J. L. Huang, Blume, Ford, & Baldwin, 2015; J. L. Huang et al., 2016). However, the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987) suggests that the maintenance of training effects is a function of volitional, i.e., implemental, rather than motivational mechanisms. Building on this theoretical perspective, we argue that participants need to shift from a motivational mindset to a volitional mindset by means of action planning and entrepreneurial action. By incorporating Gollwitzer's (1990; Heckhausen & Gollwitzer, 1987) notion of motivational and volitional mindsets into the context of entrepreneurship training effects, we enrich theories of training transfer and provide a better understanding of the maintenance of entrepreneurship training effects over time.

Third, our study provides a novel view on the entrepreneurial process that is triggered by entrepreneurship training. The entrepreneurial process is commonly viewed as a sequential process leading from opportunity identification to opportunity exploitation (Ardichvili et al., 2003; Baron, 2007; Shane & Venkataraman, 2000). Transferring this model of the entrepreneurial process to entrepreneurship training, entrepreneurship trainings have been designed with the goal of fostering opportunity identification, assuming that the identification of a promising opportunity stimulates subsequent actions to exploit the opportunity (e.g., DeTienne & Chandler, 2004; Gielnik, Frese, et al., 2015). However, we argue that the entrepreneurial process proceeds differently in the context of entrepreneurship training. In entrepreneurship trainings, the severe time and context constraints as well as participants' limited knowledge and experience create a context in which participants are unlikely to immediately discover an opportunity which is promising enough to trigger a successful entrepreneurial process (DeTienne & Chandler, 2004; Thrane et al., 2016). Instead, participants need to engage in an active learning process which starts with experimenting and acting on preliminary opportunities (Alvarez & Barney, 2007; Baker & Nelson, 2005; Sarasvathy, 2001; Thrane et al., 2016). By experimenting and acting on preliminary opportunities, participants develop a deeper understanding of what constitutes a promising opportunity and, thus, become more and more competent in identifying opportunities over time. This re-conceptualization of the entrepreneurial process in entrepreneurship trainings allows us to better understand the causal chain triggered by entrepreneurship training and to design more effective trainings (Davidsson, 2003; Glynn, Barr, & Dacin, 2000; Shepherd, 2015).

4.2 Entrepreneurship Training and Opportunity Identification

In this study, we develop a theoretical model on the roles of action planning and entrepreneurial action for the effect of entrepreneurship training on opportunity identification over time. Opportunity identification describes the cognitive process of identifying new means-ends relationships to bring a new product, service, or process to the market (Shane & Venkataraman, 2000). Action planning refers to the formation of action plans, i.e., specific plans about when and how to perform a certain entrepreneurial action (Frese, Krauss, et al., 2007). Action plans are mental simulations of an action and, thus, direct antecedents of entrepreneurial action (Frese, 2009). Entrepreneurial action represents those types of actions that are intended to generate entrepreneurial outcomes (Alvarez & Barney, 2007; Frese & Zapf, 1994; Shane & Venkataraman, 2000). Actions are the more meaningful, the more effort has been put into them (Frese & Zapf, 1994). Thus, the broader concept of entrepreneurial action implies that a certain amount of effort has already been put into these actions, so as to make the actions particularly meaningful.

Our study focuses on action-based entrepreneurship trainings. Action-based entrepreneurship trainings put a particular focus on entrepreneurial action (Frese, Gielnik, & Mensmann, 2016; Rasmussen & Sørheim, 2006). A useful theory to understand action-based entrepreneurship trainings is action regulation theory (Frese & Zapf, 1994). According to action regulation theory, trainings should emphasize two features, i.e., learning through action principles and action learning (Frese & Zapf, 1994). The first feature, i.e., learning through action principles, means that participants learn concrete action principles rather than abstract theoretical knowledge (Frese, Beimel, & Schoenborn, 2003). Action principles are rules of thumb or heuristics that are derived from theoretical and empirical evidence and that provide specific knowledge about what to do and how to do something in order to accomplish a certain goal (Frese et al., 2003, 2016; Frese & Zapf, 1994; Gielnik, Frese, et al., 2015). Accordingly, action-based entrepreneurship trainings include evidence-based action principles about how to become a successful entrepreneur (Gielnik, Frese, Bischoff, Muhangi, & Omoo, 2016; Gielnik, Frese, et al., 2015). The second feature, i.e., action learning, means that participants actively perform the target behavior (Frese & Zapf, 1994). Performing the target behavior is necessary to sharpen the understanding of action principles and to develop skills via feedback from reality (Bischoff, Gielnik, & Frese, 2014). Action learning has been incorporated into action-based entrepreneurship trainings by asking

participants to start and operate micro-businesses in the training (Gielnik et al., 2016; Gielnik, Frese, et al., 2015).

4.2.1 Short-Term Effects of Entrepreneurship Training

We first replicate the short-term effects of entrepreneurship training on opportunity identification, action planning, and entrepreneurial action shown by Gielnik, Frese et al. (2015). By short-term effects, we mean substantial boosts in participants' opportunity identification, action planning, and entrepreneurial action immediately (i.e., one week) after the training. The entrepreneurship training at hand was an action-based entrepreneurship training emphasizing learning through action principles and action learning. Both learning through action principles and action learning promote participants' opportunity identification, action planning, and entrepreneurial action (Frese & Zapf, 1994). First, the action principles included in the training provide participants with knowledge required for these tasks. For instance, in a session on opportunity identification, participants learn heuristics derived from the creativity literature (e.g., Ward, 2004; Zhou, 2008), such as to build on one's personal strengths to identify opportunities. Also, in a training session focusing on developing and implementing plans, participants are taught concrete guidelines how to develop and use action plans (Frese & Zapf, 1994). Finally, every training session includes teaching action principles that are directed toward the successful implementation of entrepreneurial actions. Such action principles equip participants with concrete knowledge about what to do and how to do something in order to identify opportunities, to form action plans, and to engage in entrepreneurial action. This knowledge can be easily applied to related tasks outside the training context and thereby promotes participants' opportunity identification, action planning, and entrepreneurial action (Frese & Zapf, 1994; Goldstein, 1986).

Second, the entrepreneurship training emphasizes action learning, in that participants actively engage in opportunity identification, action planning, and entrepreneurial action during the training. By actively identifying opportunities, forming action plans, and engaging in entrepreneurial action, participants connect the learned action principles with concrete behavior and thereby develop a better understanding of the action principles related to these tasks (Bischoff et al., 2014; Frese & Zapf, 1994). Moreover, the active engagement in these tasks allows participants to gather feedback from reality, which promotes their skills related to these tasks (Bischoff et al., 2014; Frese et al., 2003; Frese & Zapf, 1994; see also

Thorndike & Woodworth, 1901). Taken together, we expect both learning through action principles and action learning to foster opportunity identification, action planning, and entrepreneurial action, leading to Hypothesis 1.

Hypothesis 1. Entrepreneurship training has a positive short-term effect on a) opportunity identification, b) action planning, and c) entrepreneurial action.

4.2.2 Long-Term Effects of Entrepreneurship Training: General Decline but Sustained Training Effects in Case of Action Planning and Entrepreneurial Action

We hypothesize that the positive effect of entrepreneurship training on opportunity identification decreases over time. The transfer literature suggests that training effects generally diminish over time (Baldwin & Ford, 1988; Blume et al., 2010). There are different theories predicting that trained behaviors decay upon training completion (e.g., Baldwin & Ford, 1988; Blume et al., 2010; see also T. R. Mitchell & James, 2001 on general timing effects). We assume that these general theories on training effects also apply to the context of entrepreneurship training and therefore posit the following generalization hypothesis:

Hypothesis 2. The effect of entrepreneurship training on opportunity identification decreases over time.

We further argue that the general decline in opportunity identification can be prevented by participants' action planning and entrepreneurial action. We build our argumentation on the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987). The theory of action phases distinguishes between distinct mindsets that are induced by engaging in congruent tasks and that are carried over to other contexts and tasks (Brandstätter & Frank, 2002; Gollwitzer & Bayer, 1999; Gollwitzer & Kinney, 1989). Specifically, a motivational mindset is elicited by deliberating on potential actions, whereas a volitional mindset is created by planning and implementing actions (Heckhausen & Gollwitzer, 1987). Thus, by engaging in action planning and entrepreneurial action, participants cross the psychological Rubicon from a motivational mindset to a volitional, i.e., implemental, mindset (Brandstätter, Heimbeck, Malzacher, & Frese, 2003; Gollwitzer & Bayer, 1999; Gollwitzer, 1996, 1999). Accordingly, entrepreneurship training participants, who do not engage in action planning and entrepreneurial action after the training, exhibit a motivational mindset. The motivational mindset tunes participants' cognitive functioning toward motivational issues, such as the

feasibility and desirability of alternative ideas or actions (Brandstätter & Frank, 2002; Brandstätter et al., 2003; Gollwitzer & Bayer, 1999; Gollwitzer, Heckhausen, & Steller, 1990; Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987). Therefore, those participants are generally geared toward motivational rather than volitional issues, which hampers their maintenance of opportunity identification over time (Gollwitzer & Bayer, 1999). In contrast, participants, who engage in action planning and entrepreneurial action after the training, develop a volitional mindset which gears them toward volitional issues, such as the efficient and determined application of newly trained behavior (Gollwitzer & Bayer, 1999; Gollwitzer & Kinney, 1989; Heckhausen & Gollwitzer, 1987). Those participants only attend to aspects and information that sustain the current behavior, such as opportunity identification, over time (Gollwitzer, 1990). Therefore, we expect that participants' action planning and entrepreneurial action sustain their engagement in opportunity identification over time (Brandstätter et al., 2003; Gollwitzer & Bayer, 1999; Gollwitzer, 1999).

The theoretical idea of action planning and entrepreneurial action sustaining training effects over time is in line with recent research on training transfer (e.g., Blume, Ford, Surface, & Olenick, 2017; J. L. Huang et al., 2016; Sparr, Knipfer, & Willems, 2017; Yelon, Reznich, & Sleight, 1997). In their dynamic transfer model, Blume et al. (2017) similarly propose that participants‘ action promotes the maintenance of trained behaviors over time. By applying trained behaviors after the training, participants produce feedback that sustains trained behaviors over time (Blume et al., 2017; Sparr et al., 2017). Similarly, Huang et al. (2016) posit a spiral notion of transfer, proposing that participants' early application of trained behaviors increase participants' awareness of future opportunities and thereby sustains trained behaviors over time. Thus, both the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987) and the recent transfer literature (e.g., Blume et al., 2017) suggest that action planning and entrepreneurial action sustain participants' opportunity identification over time, leading to the following hypothesis:

> *Hypothesis 3. The effect of entrepreneurship training on opportunity identification over time is moderated by a) action planning and b) entrepreneurial action. High action planning and entrepreneurial action sustain the effect of entrepreneurship training on opportunity identification over time.*

4.2.3 Effect of Opportunity Identification on Business Creation

We propose that opportunity identification promotes business creation. Both theoretical considerations and empirical evidence suggest that the number of identified opportunities fosters a person's tendency to start a business (Gielnik, Frese, et al., 2015; Shepherd & DeTienne, 2005; Ucbasaran, Westhead, & Wright, 2008). Describing the idea generation process as a stochastic process, Simonton (1989) noted that the more opportunities a person identifies, the higher the likelihood that he or she identifies an innovative one. Innovative opportunities promise higher returns and thus increase a person's tendency to act on them (Baron & Ensley, 2006; Choi & Shepherd, 2004; Fiet, 2002). As such, the more opportunities people identify, the higher the likelihood that they create a business out of it.

Hypothesis 4. Opportunity identification has a positive effect on business creation.

We argued that entrepreneurship training promotes opportunity identification and that opportunity identification, in turn, predicts business creation. Training theories suggest that proximal outcomes, such as opportunity identification, transmit the effect of training on more distal outcomes, such as business creation (Kraiger et al., 1993). We thus expect opportunity identification to mediate the effect of entrepreneurship training on business creation.

Hypothesis 5. Opportunity identification mediates the effect of entrepreneurship training on business creation.

4.3 Methods

4.3.1 Study Design and Procedure

We conducted a randomized controlled field experiment. We employed a longitudinal pretest-posttest design with three measurement waves over 15 months. The first measurement wave (T1) took place in the month before the training. After the first measurement wave, we randomly assigned the participants to the training group or the control group. The training group received the action-based entrepreneurship training, whereas the control group received no training. The second measurement wave (T2) took place in the month after the training. The third measurement wave (T3) took place 12 months after training completion. At each measurement wave, we collected data using questionnaires. The randomized pretest-

posttest design controlled for biases such as maturation, history, and self-selection (Campbell, 1957).

The entrepreneurship training was a 12-week action-based entrepreneurship training which was conducted at University of Dar es Salaam in Tanzania from March to June 2014. The training was modeled after a training by Gielnik, Frese et al. (2015). The training consisted of 12 weekly sessions of three hours each, covering topics from the domains of entrepreneurship, business administration, and psychology: (1) Identifying business opportunities, (2) Business plan, (3) Legal and regulatory issues, (4) Acquiring starting capital, (5) Accounting, (6) Marketing, (7) Cash-flow management, (8) Leadership and strategic management, (9) Planning and implementing plans, (10) Personal initiative, (11) Persuasion and negotiation, and (12) Networking. The sessions were taught by 10 local university lecturers who had received train-the-trainer training on the action-based training approach.

We designed the entrepreneurship training based on action regulation theory (Frese & Zapf, 1994). Accordingly, our entrepreneurship training emphasized learning through action principles and action learning. We included learning though action principles by teaching participants evidence-based action principles about what to do and how to do it in order to become a successful entrepreneur. We incorporated action learning by asking participants to start and run micro-businesses in the training. In the first session of the training, we asked participants to build entrepreneurial teams of four to seven persons, to identify a business opportunity, and to launch a business. The businesses were set up to make a profit within the 12-week training period. The participants should go through the entire entrepreneurial process under real business conditions. We provided them with starting capital of approximately 100 USD which was to be redeemed at the end of the training. In the course of the training, participants performed all major activities required in the entrepreneurial process. For example, they assembled resources, developed marketing strategies, and brought their product or service to market. Participants started different types of businesses in the training such as offering shoe shining service, providing dietary counseling, and selling quail eggs.

4.3.2 Sample

The sample comprised undergraduate students from University of Dar es Salaam in Tanzania. We informed students about the entrepreneurship training through student mailing lists, leaflets, and personal communication. The training was voluntary, not part of the curriculum, and accessible to students from all faculties and all years of study. We provided training participants with certificates stating successful participation at the end of the training.

To apply for the training, students had to fill an application form and a questionnaire. In total, 405 students applied for the training. Of these, we randomly assigned 224 students to the training group and 181 students to the control group. The 224 students assigned to the training group were divided into four classes comprising approximately 56 students each. Out of the 224 students, 44 (19.6%) students did not attend the training regularly (i.e., participated in less than eight out of 12 sessions). We excluded these 44 students from the statistical analyses to rule out potential biases caused by incomplete treatment, resulting in a total number of 180 students in the training group.[6] Independent-samples *t*-tests showed that students attending regularly did not differ significantly from those who did not attend regularly in terms of any variable ascertained before the training except for business education ($p < .05$) and family business ownership ($p < .01$). Participants who had taken business courses and participants with business owners in their family were more likely to drop out during the training.

The total sample at T1 comprised 361 students (training group: $n = 180$; control group: $n = 181$). At T2, we were able to collect data from 299 students (training group: $n = 179$; control group: $n = 120$). At T3, we obtained data from 231 students (training group: $n = 140$; control group: $n = 91$). Reasons for non-response were refusal to continue study participation and non-availability. To test for response bias, we conducted independent-samples *t*-tests examining whether the respondents at T2 or T3 differed from the non-respondents at the same measurement wave in terms of any variable assessed before the training. We did not find any significant differences between respondents and non-respondents at T2, suggesting that the drop out at T2 was not systematic and did not bias our results. Furthermore, there

[6] We also conducted all analyses without excluding the 44 students who did not attend the training regularly. These analyses led to the same pattern of results with same significance levels as reported in this paper, indicating that the results reported in this paper are robust and do not suffer from a mortality threat. The analyses represent intent-to-treat analyses, which estimate the training effect based on the original training allocation (Little & Yau, 1996; Shadish & Cook, 2009).

were no significant differences between respondents and non-respondents at T3 except for gender ($p < .01$). Male participants more likely responded at T3 than female participants.

To test our theoretical model based on a true longitudinal design (Ployhart & Vandenberg, 2010), we only included participants who took part in all three measurement waves, leading to a final sample of 230 participants with 140 participants in the training group and 90 participants in the control group. In the final sample, 183 (79.6%) participants were male. Participants ranged in age from 20 to 34 years (M = 23.56; SD = 2.07). Most participants had been in the third (60.4%) or second (23.5%) year of study at the beginning of the study (T1). The participants came from different faculties including Business School (56.3%), School of Education (17.5%), and College of Social Sciences (10%).

Prior to the start of the study, we informed all participants about the process, required commitment, and benefits of participating in the study. We also briefed the participants about the use of their data in research, their voluntariness of participating in the data collection, and their right to withdraw from the study at any time. We assured strict confidentiality. All participants agreed to take part in the study by signing the application form.

4.3.3 Measures

Entrepreneurship training. We created a measure reflecting participants' assignment to the training group or the control group. We coded the training group as "1" and the control group as "0".

Action planning. We measured action planning at T1 and T2. We used 12 items adapted from Gielnik, Frese et al.'s (2015) interview measure. In line with Gielnik, Frese et al. (2015), we first asked participants whether they intended to start a new business within the next 12 months and whether they were in the process of starting a new business at that time. If participants affirmed at least one of those two filter questions, participants were asked whether they had any plans what to do to start and run the business. If participants answered this question affirmatively as well, we asked them how detailed their plans were with regard to 12 start-up activities. The 12 activities were taken from a list of representative start-up activities that was developed by Gielnik, Frese et al. (2015) based on the entrepreneurship literature (Davidsson & Honig, 2003; Dimov, 2007; Reynolds, 2007). Sample activities include "*checking whether there is a demand or need for your product/service in the market*" and "*getting starting capital for your business*". Participants answered the items on a 5-point

response scale ranging from 1 (*not at all*) to 5 (*very much*). The mean of the items formed the score of action planning. We recoded the score of action planning to the minimum value of "1" for all participants who negated both filter questions, given that these participants had indicated that they were not involved in the start-up of a new business at that time. We further allocated a "1" to all participants who indicated that they did not have any plans for starting and running the business. Cronbach's Alpha at T1 (α = .95) and T2 (α = .94) demonstrated good internal consistency.

Entrepreneurial action. We assessed entrepreneurial action at T1 and T2. We used a measure that was developed as an interview measure by Gielnik, Frese et al. (2015) and adapted to a questionnaire format (see, for example, Gielnik et al., 2016). In line with our measure of action planning, we first used two filter questions asking participants whether they intended to start a new business within the next 12 months and whether they were in the process of starting a new business. If participants affirmed at least one question, participants were asked whether they had already conducted any activities to start and run the business. If participants also affirmed this question, we asked them how much effort they had already put into 12 start-up activities. Consistent with our measure of action planning, the start-up activities were taken from a list of start-up activities that was developed by Gielnik, Frese et al. (2015) based on the entrepreneurship literature (Davidsson & Honig, 2003; Dimov, 2007; Reynolds, 2007). Participants answered the items on a 5-point scale from 1 (*not at all*) to 5 (*very much*). We averaged the 12 items to form a scale of entrepreneurial action. We allocated the minimum score of "1" to all participants who answered both filter questions in the negative and to all participants who indicated that they had not conducted any entrepreneurial activities. Internal consistency at T1 (α = .92) and T2 (α = .92) was good.

Opportunity identification. We assessed opportunity identification at all measurement waves (T1-T3). We operationalized opportunity identification as the number of identified opportunities, which is in line with common practice and recommendations of past research (Foo, Uy, & Murnieks, 2015; Hills, Lumpkin, & Singh, 1997; Shepherd & DeTienne, 2005; Ucbasaran et al., 2008; Ucbasaran, Westhead, & Wright, 2009). We employed Gielnik, Frese et al.'s (2015) measure consisting of the following three items: "*How many opportunities for creating a business have you identified (spotted) within the last three months*", "*Out of all those opportunities, how many were in your opinion profitable*", and "*How many opportunities for creating a business have you pursued within the last three months*". Each

item was open-ended and required participants to indicate a specific number of opportunities. In line with Gielnik, Frese et al. (2015), we recoded numbers larger than 6 as 6. This process of winsorizing the data, i.e., of recoding extreme values as more reasonable values (Kennedy, Lakonishok, & Shaw, 1992), allowed us to exclude extreme responses and to approximate a normal distribution. We computed the mean over the three items to build our scale of opportunity identification. The internal consistency of the scale measured by Cronbach's Alpha at T1 (α = .75), T2 (α = .77), and T3 (α = .77) was good.

Business creation. We ascertained business creation at T1 and T3 using the item "*Are you currently the owner of a business*" (0 = *no*, 1 = *yes*). We note that participants could change their status of being a business owner from one measurement wave to the other (i.e., become or cease being a business owner). We used participants' status at T3 as dependent variable and controlled for their status at T1, which allowed us to predict change in their status of being a business owner (i.e., business creation) after the training.

Time. We created a time measure that represented the measurement wave. We allocated a "1" to represent the first measurement wave before the training (T1), a "2" to reflect the second measurement wave immediately after the training (T2), and a "3" for the third measurement wave one year after training completion (T3).

Control variables. We included gender (0 = *female*, 1 = *male*), business education, and family business ownership as control variables. We ascertained all control variables at T1. We controlled for gender and business education because these variables have been shown to affect the opportunity identification process and business creation (Davidsson & Honig, 2003; DeTienne & Chandler, 2007; Shane, 2000; Shepherd & DeTienne, 2005). We controlled for family business ownership because having a business owner in one's family impacts entrepreneurship training effects and business creation (Davidsson & Honig, 2003; Zellweger, Sieger, & Halter, 2011). We measured business education by asking participants whether they had taken any business courses prior to the training (0 = *no*, 1 = *yes*). We assessed family business ownership by asking whether any family member owned a business (0 = *no*, 1 = *yes*).

4.3.4 Method of Analysis

To test our hypotheses on the short-term effects of entrepreneurship training (Hypotheses 1a-c) and of opportunity identification (Hypotheses 4-5), we conducted linear

regression models. In all linear regression models, we controlled for prior levels of the dependent variable to include autoregressive effects and to model change rather than absolute levels of the dependent variable. To test our hypotheses on the long-term effects of entrepreneurship training (Hypotheses 2, 3a-b), we performed growth curve models using random coefficient modeling. Growth curve modeling is useful to investigate intra-individual changes over time and to detect inter-individual differences in such changes over time (Bliese & Ployhart, 2002). We calculated the growth curve models using random coefficient modeling because of the nested structure of our data. Our data comprised 690 observations nested in 230 individuals. The nested structure of our data suggests that our data are non-independent. Non-independent data violates the assumption of independent observations underlying standard fixed effects models. Applying standard fixed effects models to our non-independent data would thus produce biased parameter estimates (Bliese & Ployhart, 2002; Ployhart & Vandenberg, 2010). Random coefficient modeling, in contrast, controls for the non-independence of data and provides unbiased parameter estimates (Bliese & Ployhart, 2002). To perform random coefficient modeling, we created a two-level hierarchical data structure with opportunity identification and time on level 1 and all other variables on level 2. We conducted the random coefficient modeling analyses with the package nlme (Pinheiro et al., 2014) included in R (R Core Team, 2014). We calculated growth curve models and applied restricted maximum likelihood estimation (Bliese & Ployhart, 2002). In all models, we treated the effect of the individual as random intercept and the linear effect of time as random effect. If included in the model, we further treated the quadratic effect of time as random effect. We mean-centered all variables in all models to facilitate interpretation of parameter estimates (Preacher et al., 2006).

4.4 Results

4.4.1 Preliminary Analyses

Table 4.1 presents the means, standard deviations, and correlations of all variables. The table shows significant positive auto-correlations of opportunity identification ($r \geq .29$, $p < .01$), action planning ($r = .20$, $p < .01$), and entrepreneurial action ($r = .29$, $p < .01$), indicating that these constructs were moderately stable over time. Furthermore, results revealed that action planning and entrepreneurial action were substantially correlated at T1 ($r = .64$, $p <$

.01) and T2 (r = .70, p < .01). The strong correlations are in line with the assumption that action planning and entrepreneurial action are highly interdependent (Frese, 2009). We tested whether action planning and entrepreneurial action represented distinct variables by conducting confirmatory factor analyses using the package lavaan (Rosseel, 2012) in R (R Core Team, 2014). We compared the theorized two-factor solution with a one-factor solution at each measurement wave. Chi²-difference tests revealed that the two-factor solution fitted the data significantly better than the one-factor solution both at T1 (Chi²-difference (1) = 744.83, p < .01) and at T2 (Chi²-difference (1) = 716.00, p < .01). The results provide evidence that action planning and entrepreneurial action represented two distinct factors. We conducted independent-samples t-tests to test for differences between the training group and the control group before the training. There were no significant differences between the two groups on any variable assessed at T1, indicating that the two groups were equivalent before the training. We computed a null model to test whether opportunity identification varied within persons over time. The model revealed that 66.9% of the total variance in opportunity identification was within-person variance. As such, there was substantial within-person variance in opportunity identification over time to be investigated in our main analyses.

Table 4.1

Descriptive Statistics and Correlations of Study Variables

Variables	Time	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender [a]	T1	0.80	0.40												
2. Business education [b]	T1	0.50	0.50	.05											
3. Family business ownership [b]	T1	0.62	0.49	-.06	.09										
4. Entrepreneurship training [c]	T1	0.61	0.49	.08	.06	-.04									
5. Action planning	T1	3.63	1.08	-.01	.06	.12†	-.05								
6. Action planning	T2	3.76	1.01	.07	.06	.07	.23**	.20**							
7. Entrepreneurial action	T1	3.18	1.00	.07	.04	.21**	-.07	.64**	.23**						
8. Entrepreneurial action	T2	3.46	0.94	-.04	.08	.03	.33**	.17*	.70**	.29**					
9. Opportunity identification	T1	1.75	1.00	.05	.16*	.17*	-.07	.28**	.10	.32**	.09				
10. Opportunity identification	T2	1.95	1.06	.22**	.10	-.01	.42**	.04	.18**	.00	.23**	.29**			
11. Opportunity identification	T3	1.91	1.02	.20**	.15*	.10	.25**	.00	.20**	.08	.24**	.32**	.40**		
12. Business creation	T1	0.29	0.45	.01	.10	.30**	-.04	.25**	.09	.34**	.13†	.28**	.07	-.02	
13. Business creation	T3	0.51	0.50	.05	.06	.02	.14*	.08	.02	.21**	.17**	.21**	.14*	.32**	.26**

Note. 224 < *N* < 230. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [c] 0 = control group, 1 = training group. † $p < .10$, * $p < .05$, ** $p < .01$.

4.4.2 Hypothesis Testing

Hypotheses 1a-c posit that entrepreneurship training has positive short-term effects on a) opportunity identification, b) action planning, and c) entrepreneurial action. To test Hypotheses 1a-c, we computed linear regression models with entrepreneurship training as predictor variable and opportunity identification, action planning, or entrepreneurial action at T2 as dependent variable. We controlled for the value of the dependent variable at T1 to predict change rather than absolute levels of the dependent variable. As shown in Table 4.2, analyses revealed significant positive effects of entrepreneurship training on opportunity identification ($b = 0.94$, $SE = 0.12$, $t(218) = 7.54$, $p < .01$, see Model 2), action planning ($b = 0.50$, $SE = 0.13$, $t(222) = 3.75$, $p < .01$, see Model 4), and entrepreneurial action ($b = 0.68$, $SE = 0.11$, $t(223) = 5.96$, $p < .01$, see Model 6), providing evidence for Hypotheses 1a-c.

Table 4.2

Short-term Effects (T1-T2) of Entrepreneurship Training on Opportunity Identification, Action Planning, and Entrepreneurial Action

	Opportunity identification (T2)				**Action planning (T2)**				**Entrepreneurial action (T2)**			
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables												
Gender [a]	0.52**	0.17	0.42**	0.15	0.18	0.16	0.14	0.16	-0.15	0.15	-0.21	0.14
Business education [b]	0.10	0.14	0.04	0.12	0.08	0.13	0.05	0.13	0.15	0.12	0.11	0.11
Family business ownership [b]	-0.11	0.14	-0.08	0.13	0.11	0.14	0.12	0.13	-0.08	0.13	-0.07	0.12
Opportunity identification (T1)	0.30**	0.07	0.33**	0.06								
Action planning (T1)					0.18**	0.06	0.19**	0.06				
Entrepreneurial action (T1)									0.28**	0.06	0.30**	0.06
Main effects												
Entrepreneurship training [c]			0.94**	0.12			0.50**	0.13			0.68**	0.11
F-value	8.04		19.46		3.00		5.35		5.72		12.38	
R^2	0.13		0.31		0.05		0.11		0.09		0.22	

Note. N = 230 participants. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [c] 0 = control group, 1 = training group. ** $p < .01$.

Hypothesis 2 states that the effect of entrepreneurship training on opportunity identification decreases over time. This hypothesis corresponds to a curvilinear (inverted U-shaped) effect of entrepreneurship training on opportunity identification over time. To test this hypothesis, we performed a growth curve model regressing opportunity identification on the interaction between the quadratic term of time and entrepreneurship training. We included the linear term of time and the linear interaction between time and entrepreneurship training in the model to control for possible linear trends. We entered the control variables in step 1, the linear and quadratic terms of time in steps 2 and 3, respectively, the effect of entrepreneurship training in step 4, the linear interaction between time and entrepreneurship training in step 5, and the quadratic-by-linear interaction term between the quadratic term of time and entrepreneurship training in step 6 (Aiken & West, 1991). Model 2 of Table 4.3 presents the results. Results revealed that the interaction effect between the quadratic term of time and entrepreneurship training on opportunity identification was negative and significant (b = -0.72, SE = 0.13, $t(450)$ = -5.51, $p < .01$). To test whether the significant interaction effect was due to the hypothesized development of opportunity identification in the training group, we ran further analyses using data from the training group only. Specifically, we calculated a growth curve model regressing opportunity identification on the quadratic term of time in the training group. We included the control variables and the linear term of time in this model. As expected, there was a significant negative effect of the quadratic term of time on opportunity identification (b = -0.40, SE = 0.09, $t(276)$ = -4.60, $p < .01$, see Model 2 of Table 4.4). These results indicate a curvilinear (inverted U-shaped) development of opportunity identification over time in the training group. Figure 4.2 displays the development of opportunity identification over the three measurement waves for the training group and the control group. Training participants showed a substantial boost in opportunity identification from T1 to T2 which diminished from T2 to T3. The results conform to the hypothesized pattern and support Hypothesis 2.

Table 4.3

Results from Growth Curve Modeling Testing the Curvilinear Effect of Entrepreneurship Training on Opportunity Identification over Time

	Opportunity identification			
	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Control variables				
Gender [a]	0.37**	0.12	0.37**	0.12
Business education [b]	0.22*	0.09	0.22*	0.09
Family business ownership [b]	0.19†	0.10	0.18†	0.10
Time	0.08*	0.04	0.08*	0.04
Time^2	-0.12†	0.07	-0.12†	0.06
Entrepreneurship training [c]	0.41**	0.10	0.40**	0.10
Curvilinear effect of time				
Time x Entrepreneurship training	0.33**	0.08	0.33**	0.08
Time^2 x Entrepreneurship training			-0.72**	0.13
Deviance (-2LL)	1874.57		1848.29	

Note. Number of participants = 230. Number of observations = 684. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [c] 0 = control group, 1 = training group. † $p < .10$, * $p < .05$, ** $p < .01$.

Table 4.4

Results from Growth Curve Modeling Testing the Curvilinear Effect of Time on Opportunity Identification in the Training Group

	Opportunity identification							
	Model 1		Model 2		Model 3		Model 4	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables								
Gender [a]	0.48**	0.16	0.48**	0.16	0.48**	0.16	0.49**	0.16
Business education [b]	0.28*	0.12	0.28*	0.12	0.28*	0.13	0.27*	0.12
Family business ownership [b]	0.19	0.13	0.19	0.13	0.18	0.13	0.18	0.13
Curvilinear effect of time								
Time	0.21**	0.05	0.21**	0.05	0.21**	0.05	0.21**	0.05
Time²			-0.40**	0.09	-0.40**	0.09	-0.40**	0.09
Moderating role of action planning								
Action planning					0.03	0.07		
Time x Action planning					0.05	0.06		
Time² x Action planning					0.27*	0.10		
Moderating role of entrepreneurial action								
Entrepreneurial action							0.05	0.08
Time x Entrepreneurial action							0.04	0.06
Time² x Entrepreneurial action							0.23*	0.11
Deviance (-2LL)	1178.82		1161.05		1165.24		1163.15	

Note. Number of participants = 140. Number of observations = 418. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes.
* $p < .05$, ** $p < .01$.

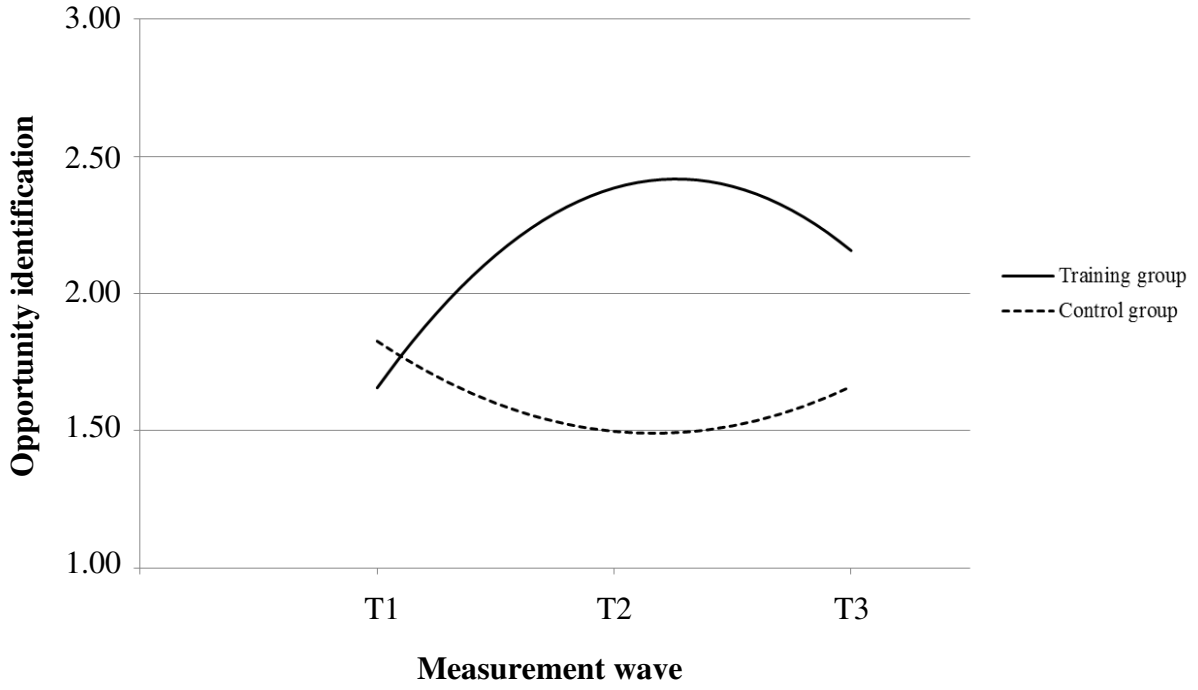


Figure 4.2. Maintenance Curves of Opportunity Identification over Time for Training Group and Control Group

Hypothesis 3a posits that the effect of entrepreneurship training on opportunity identification over time is moderated by action planning. To test Hypothesis 3a, we ran a growth curve model regressing opportunity identification on the three-way interaction between the quadratic term of time, entrepreneurship training, and action planning at T2. We included the linear term of time and the linear two-way and three-way interaction terms into the model to partial out potential linear trends (Aiken & West, 1991). Results revealed a positive and significant three-way interaction effect between the quadratic term of time, entrepreneurship training, and action planning on opportunity identification (b = 0.41, SE = 0.13, $t(446) = 3.15$, $p < .01$, see Model 2 of Table 4.5). To test whether the interaction effect reflected the hypothesized development of opportunity identification in the training group, we computed another growth curve model using only training group data. Concretely, we calculated a growth curve model regressing opportunity identification on the two-way interaction term between the quadratic term of time and action planning at T2. We controlled for the linear term of time and the linear interaction between time and action planning in this model. In line with expectations, we found a positive and significant interaction effect

between the quadratic term of time and action planning on opportunity identification in the training group (b = 0.27, SE = 0.10, $t(274)$ = 2.59, $p < .05$, see Model 3 of Table 4.4). The results suggest that action planning sustains the effect of entrepreneurship training on opportunity identification over time. To examine the sustaining role of action planning in more detail, we predicted the values of opportunity identification at each measurement wave for participants of the training group and participants of the control group with low levels of action planning (i.e., one standard deviation below the mean) and high levels of action planning (i.e., one standard deviation above the mean). The predicted values are illustrated in Figure 4.3. As expected, Figure 4.3 displays a substantial short-term increase in opportunity identification from T1 to T2 for all participants in the training group. Simple slope analyses of training group data at T1 and T2 confirmed a significant positive effect of time on opportunity identification both for participants with low action planning (t = 5.47, $p < .01$) and for participants with high action planning (t = 2.99, $p < .01$). Moving toward the long-term post-training development (T2-T3) of opportunity identification, Figure 4.3 shows that training participants' maintenance of opportunity identification was contingent on action planning. As hypothesized, training participants low in action planning showed a substantial decline in opportunity identification, whereas participants high in action planning sustained their increased level of opportunity identification. Simple slope analyses affirmed that time was negatively and significantly related to opportunity identification in case of low action planning (t = -3.31, $p < .01$), but not related to opportunity identification in case of high action planning (t = 0.58, p = .57). The results show that action planning sustains the effect of entrepreneurship training on opportunity identification over time, providing empirical evidence for Hypothesis 3a.

Table 4.5

Results from Growth Curve Modeling Testing the Moderating Role of Action Planning on the Effect of Entrepreneurship Training on Opportunity Identification over Time

	Opportunity identification			
	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Control variables				
Gender [a]	0.37**	0.12	0.35**	0.12
Business education [b]	0.22*	0.09	0.21*	0.09
Family business ownership [b]	0.18†	0.10	0.17†	0.10
Time	0.08*	0.04	0.08*	0.04
Time²	-0.12†	0.06	-0.16*	0.06
Entrepreneurship training [c]	0.40**	0.10	0.35**	0.10
Curvilinear effect of time				
Time x Entrepreneurship training	0.33**	0.08	0.32**	0.08
Time² x Entrepreneurship training	-0.72**	0.13	-0.74**	0.13
Moderating role of action planning				
Action planning			0.08	0.05
Time x Action planning			0.03	0.04
Time² x Action planning			0.11	0.07
Entrepreneurship training x Action planning			-0.12	0.10
Time x Entrepreneurship training x Action planning			0.06	0.08
Time² x Entrepreneurship training x Action planning			0.41**	0.13
Deviance (-2LL)	1848.29		1851.93	

Note. Number of participants = 230. Number of observations = 684. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [c] 0 = control group, 1 = training group. † $p < .10$, * $p < .05$, ** $p < .01$.

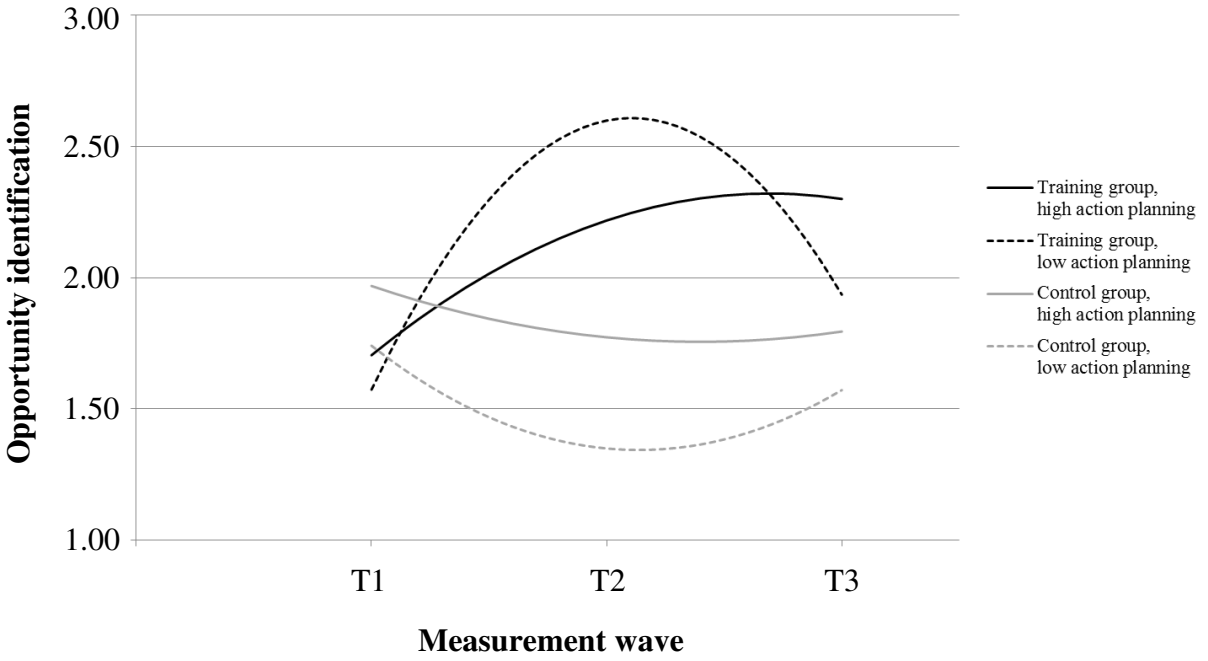


Figure 4.3. Maintenance Curves of Opportunity Identification over Time for Training Group and Control Group Conditional on Action Planning

According to Hypothesis 3b, the effect of entrepreneurship training on opportunity identification over time is moderated by entrepreneurial action. We tested this hypothesis by calculating a growth curve model regressing opportunity identification on the three-way interaction term between the quadratic term of time, entrepreneurship training, and entrepreneurial action at T2. We controlled for the linear effect of time and the linear two-way and three-way interaction terms to partial out possible linear trends (Aiken & West, 1991). Model 2 of Table 4.6 provides the results. Results showed a significant positive three-way interaction effect between the quadratic term of time, entrepreneurship training, and entrepreneurial action on opportunity identification (b = 0.36, SE = 0.14, $t(446)$ = 2.51, p < .05). To test whether the interaction effect was due to the hypothesized development of opportunity identification in the training group, we conducted further analyses with data from the training group only. We ran a growth curve model regressing opportunity identification on the two-way interaction term between the quadratic term of time and entrepreneurial action at T2. Consistent with expectations, we found a significant positive interaction effect between the quadratic term of time and entrepreneurial action on opportunity identification (b = 0.23, SE = 0.11, $t(274)$ = 2.09, p < .05, see Model 4 of Table 4.4). We predicted and plotted

the values of opportunity identification over time for participants of the training group and participants of the control group with low levels of entrepreneurial action (i.e., one standard deviation below the mean) and high levels of entrepreneurial action (i.e., one standard deviation above the mean). Figure 4.4 displays the results. The figure shows that all participants of the training group experienced a short-term increase in opportunity identification from T1 to T2. Simple slope analyses of training group data at T1 and T2 affirmed that time was positively and significantly related to opportunity identification both for participants with low entrepreneurial action (t = 5.14, p < .01) and for participants with high entrepreneurial action (t = 3.25, p < .01). Moreover, the figure reveals that participants' post-training development (T2-T3) of opportunity identification depended on entrepreneurial action. Training participants with low entrepreneurial action decreased in opportunity identification from T2 to T3, whereas training participants with high entrepreneurial action maintained their level of opportunity identification over time. Simple slope analyses confirmed that there was a significant negative relationship between time and opportunity identification in case of low entrepreneurial action (t = -2.90, p < .01), but no significant relationship between time and opportunity identification in case of high entrepreneurial action (t = 0.19, p = .85). The results support Hypothesis 3b that entrepreneurial action sustains the effect of entrepreneurship training on opportunity identification over time.

Table 4.6

Results from Growth Curve Modeling Testing the Moderating Role of Entrepreneurial Action on the Effect of Entrepreneurship Training on Opportunity Identification over Time

	Opportunity identification			
	Model 1		Model 2	
	b	*SE*	*b*	*SE*
Control variables				
Gender [a]	0.37**	0.12	0.38**	0.12
Business education [b]	0.22*	0.09	0.22*	0.09
Family business ownership [b]	0.18†	0.10	0.17†	0.10
Time	0.08*	0.04	0.08*	0.04
Time²	-0.12†	0.06	-0.17*	0.07
Entrepreneurship training [c]	0.40**	0.10	0.30**	0.10
Curvilinear effect of time				
Time x Entrepreneurship training	0.33**	0.08	0.31**	0.08
Time² x Entrepreneurship training	-0.72**	0.13	-0.74**	0.14
Moderating role of entrepreneurial action				
Entrepreneurial action			0.12*	0.05
Time x Entrepreneurial action			0.03	0.04
Time² x Entrepreneurial action			0.09	0.07
Entrepreneurship training x Entrepreneurial action			-0.18†	0.11
Time x Entrepreneurship training x Entrepreneurial action			0.02	0.08
Time² x Entrepreneurship training x Entrepreneurial action			0.36*	0.14
Deviance (-2LL)	1848.29		1849.92	

Note. Number of participants = 230. Number of observations = 684. Unstandardized regression coefficients (*b*'s) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [c] 0 = control group, 1 = training group. † $p < .10$, * $p < .05$, ** $p < .01$.

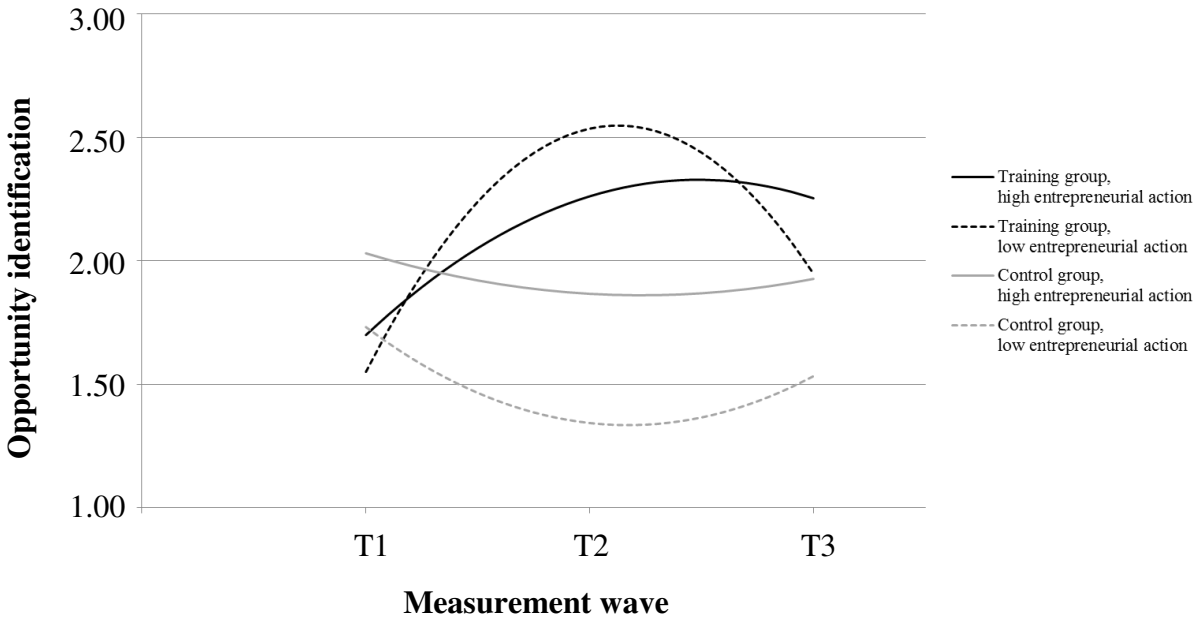


Figure 4.4. Maintenance Curves of Opportunity Identification over Time for Training Group and Control Group Conditional on Entrepreneurial Action

To test Hypothesis 4, which states that opportunity identification has a positive effect on business creation, we ran a linear regression model with opportunity identification at T3 as predictor variable and business creation at T3 as dependent variable. We controlled for business creation at T1 and for entrepreneurship training in addition to our usual controls. We found a significant positive effect of opportunity identification on business creation ($b = 0.16$, $SE = 0.03$, $t(221) = 4.94$, $p < .01$, see Model 4 of Table 4.7), which supports Hypothesis 4.

Hypothesis 5 posits that opportunity identification mediates the effect of entrepreneurship training on business creation. To test Hypothesis 5, we first performed a linear regression model with entrepreneurship training as predictor variable and opportunity identification at T3 as dependent variable. We controlled for opportunity identification at T1. Analyses revealed a significant positive effect of entrepreneurship training on opportunity identification ($b = 0.53$, $SE = 0.13$, $t(220) = 4.16$, $p < .01$, see Model 2 of Table 4.7). As shown when testing Hypothesis 4, opportunity identification, in turn, had a significant positive effect on business creation (see Model 4 of Table 4.7). We tested for a mediation effect by applying the Monte Carlo method (MacKinnon et al., 2004) with the help of a web-based calculator (Selig & Preacher, 2008). Using 20,000 replications, the Monte Carlo method yielded a significant indirect effect of entrepreneurship training on business creation through opportunity identification (indirect effect = .08, $p < .01$), supporting Hypothesis 5.

Table 4.7

Long-term Effects (T1-T3) of Entrepreneurship Training on Opportunity Identification and Business Creation

	Opportunity identification (T3)				**Business Creation (T3)**			
	Model 1		Model 2		Model 3		Model 4	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Control variables								
Gender [a]	-0.44**	0.16	0.39*	0.15	0.04	0.08	-0.03	0.08
Business education [b]	0.16	0.13	0.12	0.12	0.03	0.06	-0.02	0.06
Family business ownership [b]	0.08	0.13	0.10	0.13	-0.06	0.07	-0.10	0.07
Opportunity identification (T1)	0.30**	0.07	0.32**	0.06				
Business creation (T1)					0.31**	0.07	0.33**	0.07
Main effect								
Entrepreneurship training [c]			0.53**	0.13	0.15*	0.07	0.07	0.06
Opportunity identification (T3)							0.16**	0.03
F-value	8.96		11.16		4.64		8.34	
R^2	0.14		0.20		0.09		0.18	

Note. N = 230 participants. Unstandardized regression coefficients (b's) are shown. [a] 0 = female, 1 = male. [b] 0 = no, 1 = yes. [c] 0 = control group, 1 = training group. * $p < .05$, ** $p < .01$.

4.4.3 Additional Analyses

To test Hypothesis 4, i.e., the effect of opportunity identification on business creation, we computed a linear regression model with opportunity identification at T3 as predictor variable and business creation at T3 as dependent variable. Given that the predictor variable and the dependent variable were assessed at the same time, our results may suffer from endogeneity bias caused by common method variance, omitted variables, or reverse causality. To correct for endogeneity bias, we employed the two-stage least squares (2SLS) approach with entrepreneurship training and gender as instrumental variables (Antonakis, Bendahan, Jacquart, & Lalive, 2010; Bascle, 2008). We used two instrumental variables to ensure that the number of instruments exceeded the number of endogenous variables, which is required to test the exogeneity and validity of instruments (Bascle, 2008). We used entrepreneurship training as instrumental variable because manipulated variables represent perfect instruments (Antonakis et al., 2010). We further included gender as instrumental variable because stable individual differences also constitute appropriate instruments (Antonakis et al., 2010).

We first tested the strength of our instruments following the analytical procedure provided by Stock, Wright, and Yogo (2002). Analyses showed significant results ($p < .01$), indicating that our instruments were sufficiently correlated with the endogenous variables. We further examined the exogeneity of our instruments by employing the Sargan (1958) test. The Sargan (1958) test reached no significance ($p = .49$), which suggests that our instruments were exogenous and valid. Finally, we tested for endogeneity in the main regression model by performing the Durbin-Wu-Hausman test (Durbin, 1952; Hausman, 1978; Wu, 1973). The Durbin-Wu-Hausman test was not significant ($p = .47$), suggesting that our linear regression model did not suffer from endogeneity and thus provided unbiased coefficients. We thus continued using the linear regression model, given that this approach provides more efficient estimates compared to the 2SLS approach (Antonakis et al., 2010; Bascle, 2008). However, to test the robustness of our results, we also investigated the effect of opportunity identification on business creation using the 2SLS approach. The 2SLS approach revealed that opportunity identification at T3 had a significant positive effect on business creation at T3 ($p < .05$). As such, the 2SLS approach showed that our results on the effect of opportunity identification on business creation were not substantially biased by endogeneity and, moreover, that the effect remained significant when controlling for endogeneity.

4.5 Discussion

Research on entrepreneurship training has adopted a surprisingly static view on training outcomes, neglecting to take into account whether and how these outcomes change over time (Gielnik et al., 2017; Lorz et al., 2013). Taking the temporal dynamics of training outcomes into account, however, is key to develop an accurate understanding of the pathways through which entrepreneurship training exerts its effects (Baldwin et al., 2017; Gielnik et al., 2017; J. L. Huang et al., 2016; Lorz et al., 2013; Sitzmann & Weinhardt, 2017; Walton, 2014). We thus adopted a more dynamic perspective on training outcomes and investigated the effect of entrepreneurship training on opportunity identification over time. Our results showed that entrepreneurship training had a positive short-term effect on opportunity identification that declined over time. The decline in opportunity identification was contingent on participants' action planning and entrepreneurial action after the training. Participants showing low action planning and entrepreneurial action after training decreased in opportunity identification over time, whereas participants high in action planning and entrepreneurial action maintained high levels of opportunity identification in the long term. Opportunity identification predicted business creation. The results hold significant implications for theory and practice.

4.5.1 Theoretical Implications

First, our study enriches entrepreneurship training theory by examining the maintenance of training effects over time. Existing theories of entrepreneurship training have been limited to a static view on training effects, presuming that positive short-term effects hold over time and eventually translate into long-term effects (e.g., Gielnik, Frese, et al., 2015; Souitaris et al., 2007). Our theoretical and empirical analyses suggest, however, that training effects are dynamic and may systematically decay over time. Specifically, our results showed that the effect of entrepreneurship training on opportunity identification wears off over time. This suggests that the repeatedly reported short-term effects of entrepreneurship training may constitute straw fire effects, i.e., short-term boosts that rapidly ablate during training and die away just as rapidly after the training. Thus, we can no longer assume that short-term effects of entrepreneurship training hold over time and automatically convert into long-term effects. Instead, we need to systematically study whether, how, and on what conditions short-term training effects hold or decay over time (Gielnik et al., 2017; Lorz et

al., 2013). Our study indicates that such a shift away from the mainly static perspective on short-term training effects to a more dynamic perspective on the maintenance of training effects over time is important to better understand entrepreneurship training effects and to derive theoretically valid conclusions from empirical results (Gielnik et al., 2017).

Second, our study uncovers action planning and entrepreneurial action as mechanisms sustaining entrepreneurship training effects over time. These results add to our theoretical understanding of training transfer. Past research explaining training transfer has focused on factors affecting participants' application of trained behaviors soon after training without taking into account factors that determine the maintenance of those behaviors over time (Baldwin et al., 2017; Blume et al., 2010, 2017; J. L. Huang et al., 2016). Moreover, research on factors affecting the maintenance over time has commonly focused on participants' motivation (e.g., Baldwin et al., 2017; Blume et al., 2010; J. L. Huang et al., 2015). However, the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987) indicates that the maintenance of training outcomes depends on volitional rather than motivational mechanisms. Accordingly, we theorize that maintaining opportunity identification over time requires participants to shift from a motivational to a volitional mindset by means of action planning and entrepreneurial action (Gollwitzer, 1999; Heckhausen & Gollwitzer, 1987). By incorporating the notion of motivational and volitional mindsets into the training context, our research extends existing transfer theories and provides a more comprehensive understanding of the maintenance of training effects over time.

Third, our results on the sustaining roles of action planning and entrepreneurial action enhance our theoretical understanding of action-based entrepreneurship trainings. Our results revealed that participants need to engage in action planning and entrepreneurial action after training to maintain high levels of opportunity identification in the long term. These results are in line with past research emphasizing the role of action-based training approaches, i.e., training approaches that systematically foster action-regulatory factors such as action planning and entrepreneurial action (Gielnik, Frese, et al., 2015; Rasmussen & Sørheim, 2006). Moreover, our findings extend past research by pointing toward additional pathways through which action-based trainings exert their effects. Past research has argued that action-based entrepreneurship trainings promote action-regulatory factors which are, in turn, direct precursors of business creation (e.g., Gielnik, Frese, et al., 2015). Our research suggests, however, that the pathway leading from action-regulatory factors to business creation is more

complex. Our study shows that action-regulatory factors sustain short-term training effects over time, which then promote business creation in the long run. As such, our study provides a more comprehensive understanding of the mechanisms underlying action-based entrepreneurship training effects (Bell & Kozlowski, 2008; Gielnik, Frese, et al., 2015; Gully, Payne, Koles, & Whiteman, 2002; Keith & Frese, 2005; Kozlowski & Bell, 2006).

Fourth, our study suggests that entrepreneurship training theory should explicitly consider the differential roles of mechanisms in facilitating entrepreneurship training's short-term and long-term effects. Our results showed that action planning and entrepreneurial action facilitate the effect of entrepreneurship training on opportunity identification in the long term, but not in the short term. Thus, solely relying on short-term effects may obscure the positive impact of mechanisms that promote long-term effects (Keith & Frese, 2008). Instead, entrepreneurship training theory should particularly consider the roles of mechanisms with regard to long-term effects (Baldwin et al., 2017; Yelon, Ford, & Anderson, 2014), given that the ultimate goal of entrepreneurship training is to foster long-term change rather than short-term change (Foxx & Harrisburg, 2013; Gielnik et al., 2017).

Finally, our study re-conceptualizes the entrepreneurial process that is triggered by entrepreneurship training. Past research on entrepreneurship training has built on common conceptualizations of the entrepreneurial process leading from opportunity identification to opportunity exploitation (e.g., DeTienne & Chandler, 2004; Gielnik, Frese, et al., 2015). Our theoretical analysis and empirical results suggest, however, that the entrepreneurial process proceeds differently in the context of entrepreneurship training (Glynn et al., 2000; Shepherd, 2015; Thrane et al., 2016). Theoretical considerations indicate that the entrepreneurial process triggered by entrepreneurship trainings does not start with the identification of a promising opportunity, but rather with participants' experimentation and action upon preliminary opportunities, leading to the identification of promising opportunities in the long run (Alvarez & Barney, 2007; Baker & Nelson, 2005; Sarasvathy, 2001; Thrane et al., 2016). Our empirical results provide initial support for these assumptions by showing that action planning and entrepreneurial action foster the identification of a high number of opportunities in the long term. Identifying opportunities in the long term promotes business creation. Thus, by adapting the conceptualization of the entrepreneurial process to the specific context of entrepreneurship training, our study provides a more accurate presentation of the causal chain triggered by entrepreneurship training (Davidsson, 2003; Glynn et al., 2000; Shepherd, 2015).

4.5.2 Practical Implications

Our findings offer at least three implications for practice. First, our results on the roles of action planning and entrepreneurial action provide practical guidelines for the design and delivery of entrepreneurship trainings. Our results showed that participants need to engage in action planning and entrepreneurial action after training in order to maintain high levels of opportunity identification in the long term. High levels of opportunity identification, in turn, promote business creation. As such, our study substantiates the need to foster participants' action planning and entrepreneurial action, for example with the help of action-based trainings (Gielnik, Frese, et al., 2015; Neck & Greene, 2011; Rasmussen & Sørheim, 2006). Action-based entrepreneurship trainings, which typically include the start-up of a new business, however, may not be easily integrated into curricula, given that such trainings demand high flexibility and do not provide clear standards for grading procedures (Gielnik, Frese, et al., 2015; Rasmussen & Sørheim, 2006). We thus recommend offering action-based entrepreneurship trainings as voluntary courses that students may take besides their curricula and that provide them with an additional certificate in entrepreneurship.

Second, our study suggests complementing action-based entrepreneurship trainings with additional interventions before and after the training. Our results showed that action-based entrepreneurship training generally fosters participants' action planning and entrepreneurial action after training, which, in turn, sustain their opportunity identification over time. However, our results also revealed that action-based entrepreneurship training affects different participants differently, with some participants showing low levels of action planning and entrepreneurial action after training and, consequently, decreasing their engagement in opportunity identification over time. As such, action-based entrepreneurship trainings should be supplemented by auxiliary interventions that reinforce the training effect over time (Grossman & Salas, 2011; Salas & Stagl, 2009). For instance, practitioners could offer a pre-training intervention, i.e., an additional session prior to the training, in which they encourage participants to engage in action planning and entrepreneurial action after training. In addition, practitioners may assess participants' action planning and entrepreneurial action after training and allocate post-training interventions especially to those participants who show low action planning and entrepreneurial action (J. L. Huang et al., 2016). By incorporating such pre- and post-training techniques into the training design, practitioners

could systematically promote participants' transition from a motivational to a volitional mindset and, thereby, facilitate the maintenance of training outcomes over time.

Third, our study provides important implications for evaluation practice. Evaluation practice has focused on short-term effects, assessing training outcomes at one time point immediately or soon after training (B. C. Martin et al., 2013). Our results indicate, however, that such short-term evaluations may yield inaccurate conclusions about training effects (Keith & Frese, 2008; Yelon, Ford, & Golden, 2013). First, short-term evaluations may present ineffective trainings as effective by revealing straw fire effects, i.e., significant short-term boosts that ablate over time. Second, solely focusing on short-term effects may obscure crucial mechanisms, such as action planning and entrepreneurial action, that may not affect short-term effects, but that are required to sustain short-term effects over time (Yelon et al., 2013). As such, we echo prior calls for more sophisticated evaluation practice, which includes repeated assessments of training outcomes after training and thus allows more accurate conclusions about entrepreneurship training effects (Gielnik et al., 2017; B. C. Martin et al., 2013).

4.5.3 Strengths and Limitations

A strength of our study is its randomized controlled field experimental design encompassing three measurement waves over 15 months. Randomized controlled field experiments represent the gold standard in evaluation research (Reay et al., 2009). The randomized pretest-posttest design allowed us drawing strong causal conclusions about entrepreneurship training effects by controlling for methodological biases (Campbell, 1957). In addition, the longitudinal study design incorporating one measurement wave before the training and two measurement waves after the training enabled us to uncover whether and on what conditions short-term training effects are maintained over time. As such, our study answers repeated calls for methodologically more rigorous and theoretically grounded studies investigating the impact of entrepreneurship training over time (Glaub & Frese, 2011; Honig, 2004; Lorz et al., 2013; B. C. Martin et al., 2013; Pearce & Sims, 2002; Pittaway & Cope, 2007; Souitaris et al., 2007; von Graevenitz, Harhoff, & Weber, 2010).

While our study design allowed us to analyze the maintenance of training outcomes over time, our analyses are limited to a period of 12 months after training completion. Given that entrepreneurship is a long process covering more than 12 months (Reynolds & Curtin,

2008), it would be interesting to assess the maintenance of training outcomes over a longer period of time. Our theoretical analysis based on the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987), however, suggests that the maintenance curves shown in this study also hold over a longer period of time. Moreover, theoretical arguments derived from the transfer literature (Blume et al., 2017; J. L. Huang et al., 2016) indicate that the maintenance curves may even intensify over time. In our study, participants high in action planning and entrepreneurial action maintained their increased levels of opportunity identification up to 12 months after the training. According to J. L. Huang et al. (2016), the prolonged engagement in opportunity identification after the training increases participants' proficiency in opportunity identification, which, in turn, promotes their willingness to engage in opportunity identification over time. Participants showing low action planning and entrepreneurial action after training, in contrast, decreased their engagement in opportunity identification over time. The limited engagement in opportunity identification may result in skill decay and, thereby, prevent participants from identifying opportunities later in time (Blume et al., 2017; Ellington, Surface, Blume, & Wilson, 2015; J. L. Huang et al., 2016; Salas, Tannenbaum, Kraiger, & Smith-Jentsch, 2012). As such, the sustaining effects of action planning and entrepreneurial action shown in this study may reinforce themselves over time and thus play a similar role for the maintenance of training outcomes over a longer period of time. Nevertheless, future research may extend the post-training interval outward of 12 months to investigate the maintenance of training effects over an extended period of time (Foxx, Bittle, & Faw, 1989; Foxx & Harrisburg, 2013).

Another potential limitation may be the context of our study. We conducted our study in Tanzania. Tanzania is a developing country with a gross national income per capita of 930 USD compared to a gross national income per capita of 55,200 USD in the United States (The World Bank, 2015). The widespread poverty and the high unemployment rate in Tanzania may push people into entrepreneurship and thereby facilitate participants' entry into entrepreneurship after the training (Ndyali, 2016). Thus, the positive training effects shown in this study may take longer time to unfold in more developed countries (Gielnik et al., 2017). Indeed, the effects of entrepreneurship training have been shown to vary across different countries (Bae, Qian, Miao, & Fiet, 2014; Walter & Block, 2016). Future research may thus test the generalizability of our results in more developed countries and over extended periods of time. While the generalizability of our results is open to question, however, we consider

our results on entrepreneurship training effects in developing countries to be particularly valuable. Developing countries are the countries that most require entrepreneurship trainings, which renders research explaining entrepreneurship trainings effects in those countries especially important (Mead & Liedholm, 1998; van Praag & Versloot, 2007). Additionally, people living in developing countries represent the majority of the world population and thus need to be included in research to yield representative results (Arnett, 2008; Bruton, 2010; Reynolds, 2012). Against this background, scholars have called for more entrepreneurship research in developing countries in order to refine existing theories which are commonly based on data solely stemming from more developed countries (Bruton, 2010; G. George et al., 2016; Reynolds, 2012). We answer these calls and add to our understanding of entrepreneurship training effects in Tanzania – a part of the world where it is most needed.

The age and student status of our participants may further limit the generalizability of our results. First, our participants were relatively young. Young people exhibit a high focus on opportunities, which means that they expect and look for opportunities in the future (Cate & John, 2007; Gielnik, Zacher, & Frese, 2012; Zacher & Frese, 2009). Participants' high focus on opportunities may have strengthened the effect of entrepreneurship training on opportunity identification in our study. This means that older people with lower foci on opportunities may show stronger declines in opportunity identification after training. Moreover, older people may require higher levels of action planning and action to countervail their decline in opportunity identification after training. Therefore, future research may replicate our results using older participants. Second, our participants were university students who may have better access to financial resources than non-educated people in developing countries. Given that financial resources increase participants' propensity to identify opportunities and to start a business (Ardichvili et al., 2003; Ho & Wong, 2007), the training effects shown in this study may be lower in non-academic samples. While future studies may thus replicate our findings using non-academic samples, we note that most entrepreneurship trainings have been conducted with academic samples (B. C. Martin et al., 2013). Hence, our study adds to our understanding of entrepreneurship training effects on students who represent the primary target group of these trainings and thus constitute an appropriate sample for evaluation studies (B. C. Martin et al., 2013).

4.5.4 Directions for Future Research

Our study points toward several avenues for future research. First, future research may build on our study and investigate the maintenance of further training outcomes over time. Building on the transfer literature (Baldwin & Ford, 1988; Blume et al., 2010) and the theory of action phases (Gollwitzer, 1990; Heckhausen & Gollwitzer, 1987), we argued that entrepreneurship training outcomes tend to decay after training and that this decay is prevented by participants' action planning and entrepreneurial action. These processes should not be specific to the maintenance of opportunity identification, but similarly apply to the maintenance of other entrepreneurship training outcomes, such as opportunity exploitation (Gielnik, Frese, et al., 2015) and personal initiative (Glaub, Frese, Fischer, & Hoppe, 2014). Hence, there are theoretical reasons to believe that our results on the maintenance of opportunity identification are generalizable to other training outcomes. However, the transfer literature suggests that maintenance patterns vary among different training outcomes (Baldwin & Ford, 1988). An important task of future research is thus to examine whether the maintenance patterns shown in this study similarly apply to other entrepreneurship training outcomes. Such research investigating how and on what conditions different training outcomes are maintained over time would further add to our theoretical understanding of long-term entrepreneurship training effects (Gielnik et al., 2017).

Second, future research should identify further mechanisms that bolster short-term training effects over time. While our study identifies action planning and entrepreneurial action as key mechanisms sustaining entrepreneurship training effects over time, there may be several further factors that promote participants' action planning and entrepreneurial action and, thereby, indirectly affect the maintenance of opportunity identification over time. According to action regulation theory (Frese & Zapf, 1994), participants' tendency to engage in action planning and entrepreneurial action depends on personality traits such as goal orientation (Frese, Stewart, & Hannover, 1987; Zacher & Frese, in press) and trait procrastination (Blume et al., 2017; Steel, 2007). Future research may thus identify specific traits that promote action planning and entrepreneurial action and, thereby, the maintenance of entrepreneurship training effects over time.

Third, future studies may provide a more fine-grained investigation of the dynamic development of entrepreneurship training outcomes over time (J. L. Huang et al., 2016). Our study offers insights into general change patterns of opportunity identification up to 12

months after training completion. However, training outcomes such as opportunity identification are dynamic in nature and may change more rapidly over time in response to various external and internal mechanisms (Lord et al., 2010). Therefore, it would be interesting to capture more fine-grained, discontinuous changes in training outcomes over time (J. L. Huang et al., 2016). For example, future studies may employ experience sampling methodology (Uy et al., 2010) to provide novel insights into the dynamic changes and predictors of those rapid changes in participants' behavior after training completion (Baldwin et al., 2017).

Finally, future research may systematically compare the effects of alternative training approaches on the maintenance of entrepreneurship training outcomes over time. Our results on the sustaining roles of action planning and entrepreneurial action suggest that action-based training approaches foster the maintenance of training outcomes over time. However, we note that our study does not allow any conclusions regarding the effectiveness of different training approaches, such as action-based training approaches compared to more academic-focused approaches. Experimental field studies with random assignment to different training approaches may disclose which specific type of entrepreneurship training is most effective in sustaining training outcomes over time (Rauch & Hulsink, 2015; Souitaris et al., 2007).

4.5.5 Conclusion

Entrepreneurship training theory has been restricted to a static view on training effects, neglecting whether, how, and on what conditions these effects hold over time. We adopted a dynamic perspective on training effects and examined the effect of entrepreneurship training on opportunity identification over time. Our results suggest that the repeatedly reported short-term training effects tend to quickly die away like a straw fire and that action-regulatory factors are important mechanisms sustaining the positive effects over time. As such, research can no longer neglect the temporal dynamics that are inherent in training outcomes. Instead, future research should follow our route leading from a mainly static and short-term focus toward a more dynamic and long-term perspective on entrepreneurship training outcomes. Such a dynamic perspective is important to develop an accurate theoretical understanding of entrepreneurship training effects and to devote resources to entrepreneurship trainings wisely.

5. General Discussion

In this dissertation, I investigated entrepreneurs' motivation and cognition from a dynamic perspective. Specifically, in three different research papers focusing on different motivational and cognitive processes, I developed comprehensive theoretical models that emphasized dynamic changes in these processes and their roles over time. The theoretical analyses and empirical findings showed that considering temporal dynamics in motivational and cognitive processes is fundamental to develop an accurate theoretical understanding of the mechanisms underlying successful entrepreneurship (Lord et al., 2010; Mcmullen & Dimov, 2013; T. R. Mitchell & James, 2001). First, our theoretical investigation of creativity in entrepreneurship revealed that the role of creativity continuously changes throughout the entrepreneurial process. By taking the alternating role of creativity over time into account, we resolved apparent contradictions in past research and illuminated diverse effects of creativity throughout the entrepreneurial process which a more static approach would have obscured (Lord et al., 2010; Mcmullen & Dimov, 2013; T. R. Mitchell & James, 2001). Second, our theoretical model and empirical findings on the role of passion in entrepreneurship demonstrated that the relationships between feelings of entrepreneurial passion, self-efficacy, and success are dynamic and reciprocal rather than static and unidirectional. Taking a more dynamic perspective on passion and surrounding factors in entrepreneurship allowed us to reconcile hitherto fragmented theoretical perspectives and to provide a more integrated picture of the relationships between feelings of entrepreneurial passion, self-efficacy, and success (Baron, 2007; Dalal & Hulin, 2008; J. M. George & Jones, 2000; Lord et al., 2010). Finally, our theoretical and empirical analyses of the effect of entrepreneurship training on opportunity identification over time indicated that entrepreneurship training effects systematically decay over time and that action planning and entrepreneurial action are key mechanisms sustaining the effects in the long run. By taking temporal dynamics in training outcomes into account, we provided a more integrated perspective on short- and long-term effects of entrepreneurship training and, thereby, enriched our theoretical understanding of how and on what conditions entrepreneurship training exerts its effects (Baldwin et al., 2017; Gielnik et al., 2017; J. L. Huang et al., 2016; Lorz et al., 2013; Sitzmann & Weinhardt, 2017; Walton, 2014).

5.1 General Theoretical Implications

The findings of this dissertation hold important theoretical implications. First, our results point out that taking temporal dynamics in entrepreneurs' motivation and cognition into account is important to accurately represent and fully understand mechanisms underlying successful entrepreneurship. Past research has mainly treated entrepreneurs' motivation and cognition as static phenomena and, thus, investigated these phenomena at only one point in time (Baron, 2007; Chandler & Lyon, 2001; Gilbert et al., 2006; Mcmullen & Dimov, 2013). The theoretical and empirical analyses reported in this dissertation, however, showed that entrepreneurs' motivation and cognition are dynamic processes that systematically change in their levels and roles over time. For instance, our theoretical analysis of creativity in entrepreneurship revealed that the impact of two cognitive processes underlying creativity, i.e., divergent and convergent thinking, changes considerably throughout the entrepreneurial process. Moreover, by investigating dynamic changes in entrepreneurs' feelings of passion, self-efficacy, and success over time, we uncovered that entrepreneurs' motivational processes also rapidly change over short periods of time. As such, this dissertation re-emphasizes the need to shift away from the mainly static approaches toward more dynamic perspectives on entrepreneurs' motivation and cognition in order to develop a richer and more accurate theoretical understanding of the dynamic mechanisms underlying entrepreneurship (e.g., Dalal & Hulin, 2008; Gielnik, Barabas, et al., 2014; Mcmullen & Dimov, 2013).

Second, our findings represent important steps toward more integrated entrepreneurship theories (Baron, 2007; Dalal & Hulin, 2008; J. M. George & Jones, 2000; Lord et al., 2010). Past research has provided important, yet fragmented, theoretical frameworks that often explain only a small fraction of complex entrepreneurial phenomena (Aldrich & Baker, 1997; Busenitz, Plummer, Klotz, Shahzad, & Rhoads, 2014; Cornelius, Landström, & Persson, 2006). Moreover, different theoretical frameworks sometimes provide inconsistent or even contradictory assumptions for the same entrepreneurial phenomena (Oganisjana, Koke, Rahman, Fernate, & Rutka, 2014). The fragmented nature and competing assumptions of different frameworks leave our theoretical understanding of phenomena in various fields of entrepreneurship incomplete. Scholars have thus pointed toward the need of reconciling and integrating the hitherto fragmented theories into more inclusive theoretical frameworks (Bögenhold, Fink, & Kraus, 2014; Wright & Wallis, 2015). The results of this dissertation demonstrate that such integrated theories may be established by adopting a more dynamic

view on entrepreneurial phenomena. Specifically, in three different research papers reported in this dissertation, taking a more dynamic perspective on entrepreneurial phenomena allowed us to resolve apparent contradictions in past research and to integrate existing theoretical perspectives into more inclusive theoretical frameworks. Thus, approaching entrepreneurial phenomena from a more dynamic point of view may be an important step towards a more integrated understanding of entrepreneurial phenomena in the future (Baron, 2007; Dalal & Hulin, 2008; J. M. George & Jones, 2000; Lord et al., 2010).

5.2 General Practical Implications

The results of this dissertation also hold significant implications for practice. First, our results indicate that entrepreneurs need to engage in fundamentally different cognitive processes during the entrepreneurial process. Specifically, Chapter 2 showed that earlier stages of the entrepreneurial process mainly require entrepreneurs' divergent thinking, whereas later stages primarily call for convergent thinking. Moreover, the needs of divergent and convergent thinking alternate continuously within each stage of the entrepreneurial process. Therefore, entrepreneurs need to flexibly adapt their cognitive strategies to the ever-changing demands of the entrepreneurial process. Practitioners, such as entrepreneurship trainers and coaches, should promote entrepreneurs' ability to flexibly adapt their cognitive strategies by creating awareness of the alternating needs of divergent and convergent thinking throughout the entrepreneurial process. Given that the effects of such cognitive processes continuously alternate both in magnitude and in direction, simplistic recommendations or interventions to generally increase these cognitive processes may have no or even detrimental effects (Bledow, 2013; Bledow et al., 2009). Instead, practitioners need to establish an understanding of the ever-changing demands inherent in the entrepreneurial process.

Second, the results of this dissertation point toward the need to sustain entrepreneurs' motivation and cognition over time. Specifically, Chapter 3 showed that entrepreneurs' motivation substantially varies over time. In addition, Chapter 4 revealed that entrepreneurship training participants' cognition systematically decays after the training. However, to successfully start and run a business, entrepreneurs need to maintain high levels of motivation and cognition over long periods of time (Carter et al., 1996; Gartner, 1985; Reynolds & Curtin, 2008). Therefore, practitioners should offer interventions that are

specifically targeted at fostering entrepreneurs' resilience and, thereby, at sustaining entrepreneurs' motivation and cognition in the long term (Ayala & Manzano, 2014).

Third, our results also hold important implications for research practice. Existing empirical research has focused on cross-sectional designs, investigating entrepreneurs' motivation and cognition at only one point in time (e.g., Baron, 2007; Dalal & Hulin, 2008; Mcmullen & Dimov, 2013). Furthermore, empirical research including multiple measurement waves has usually selected the number of and time lag between measurement waves arbitrarily or due to pragmatic reasons (Ancona et al., 2001; T. R. Mitchell & James, 2001). By pointing toward dynamic changes in the levels and roles of entrepreneurs' motivation and cognition over time, this dissertation re-emphasizes the need to shift away from the mainly static cross-sectional approach to a more dynamic measurement of motivational and cognitive processes over time. Moreover, this dissertation informs future empirical research with regard to the appropriate number of and time lags between measurement waves. For example, the results of Chapter 2 suggest that future studies should measure the impact of motivational and cognitive mechanisms in different stages of the entrepreneurial process in order to fully understand the role of such mechanisms in entrepreneurship. In addition, the studies reported in Chapter 3 revealed that feelings of entrepreneurial passion, self-efficacy, and success systematically fluctuate over a period of few weeks. Future research investigating the relationships between these and related mechanisms should thus rely on relatively short time lags of few weeks or less to detect existing relationships that would otherwise be obscured by substantial within-person changes between the measurement waves (Gielnik, Barabas, et al., 2014; T. R. Mitchell & James, 2001). Finally, Chapter 4 revealed that entrepreneurship training effects systematically decay over time. These results suggest that entrepreneurship researchers and practitioners need to examine training outcomes up to at least one year after training completion in order to fully understand whether, how, and on what conditions entrepreneurship training exerts its effects. In sum, by investigating dynamic changes in the levels and roles of entrepreneurs' cognition and motivation over time, this dissertation informs theory about when and how often to assess entrepreneurs' cognition and motivation throughout the entrepreneurial process (Ancona et al., 2001; J. M. George & Jones, 2000; T. R. Mitchell & James, 2001).

5.3 General Conclusion

In conclusion, this dissertation represents an important step toward a more dynamic conception of entrepreneurship. By examining dynamic changes in the levels and roles of entrepreneurs' motivation and cognition over time, the research reported in this dissertation discovered key mechanisms which more static approaches would have obscured. Yet, there are still many more entrepreneurial mechanisms out there that have been exclusively studied in a rather static way. Therefore, future research should continue shifting away from the common static approaches toward more dynamic views on entrepreneurial phenomena. Adopting a more dynamic perspective on entrepreneurial phenomena may contribute to a more integrated understanding of the mechanisms underlying successful entrepreneurship. Such an integrated understanding is key to promote successful entrepreneurship and, thereby, its positive effects on economic growth and wealth creation.

6. References

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