

**When the going gets tough –  
How entrepreneurs learn from problems and failures**



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## **1. General introduction**

### **1.1 The importance of entrepreneurship**

Entrepreneurship is defined as the process of discovery, evaluation, and exploitation of business opportunities for new products and services (Shane & Venkataraman, 2000). Entrepreneurship is one of the most important economic forces and a driver for economic, societal, and individual development (Ács, Desai, & Hessels, 2008; Baumol, 1990; Mead & Liedholm, 1998; Schumpeter, 1950). Entrepreneurship unfolds its positive effect on development through influencing employment, innovation, productivity and growth, and life satisfaction. First, entrepreneurial firms have a positive effect on employment because they grow, proportionately, faster than other firms and thus create more jobs (van Praag & Versloot, 2007). Similarly, research suggests that increases in self-employment result in reductions in unemployment (Fritsch, 2008; Thurik, Carree, van Stel, & Audretsch, 2008). Second, entrepreneurship functions as a catalyst for innovation (Shane, 2000). According to Joseph Schumpeter's concept of "creative destruction," entrepreneurs upset the status quo, disrupt common ways of doing things, and as a result create new market opportunities (Schumpeter, 1934; Smilor, 1997). This is in line with empirical results demonstrating that entrepreneurial activity has a positive effect on technological change (Ács & Varga, 2005). Third, entrepreneurial firms experience higher growth in production value and labor productivity than other firms (van Praag & Versloot, 2007). Consequently, entrepreneurship has a positive effect on GDP growth (Carree & Thurik, 2008). Research suggests that there is a close relation between entrepreneurship and regional and local development (Stephens & Partridge, 2011). Fourth, research suggests that entrepreneurs are more satisfied with their jobs and their lives than non-entrepreneurs (van Praag & Versloot, 2007). This is somewhat surprising, as entrepreneurs report working under high pressure, feeling a heightened level of stress, and working longer hours than employees (Blanchflower, 2004). It seems that the positive aspects of self-employment such as high levels of autonomy (Benz & Frey, 2008) and greater personal income gains (Cardon & Patel, 2015) outweigh the negative effects.

### **1.2 Entrepreneurial learning as an important success factor in entrepreneurship**

Due to the importance of entrepreneurship for economic, societal, and individual development, researchers have sought to understand the factors that drive successful entrepreneurship. Scholars have focused on economic factors (e.g., access to capital) (Blanchflower & Oswald, 1998; Ho & Wong, 2007), social factors (e.g., social networks)

(Davidsson & Honig, 2003; Kodithuwakku & Rosa, 2002), and individual factors (e.g., knowledge) (Davidsson & Honig, 2003). Recently, scholars have especially acknowledged the importance of individual factors as important drivers for business success (Baum, Frese, & Baron, 2007; Baum, Locke, & Smith, 2001; Frese & Gielnik, 2014). Individual factors are important because entrepreneurship is a process that is highly determined by the actions of entrepreneurs (Frese, 2007, 2009). Entrepreneurs take action to identify, evaluate, and exploit business opportunities (Frese, 2009; Shane & Venkataraman, 2000). Thus, the individual entrepreneur and his or her actions are central to an understanding of entrepreneurship (Gielnik & Frese, 2013).

The basic assumption of this dissertation is that entrepreneurial learning is one of the most important individual factors for business success. By its nature, entrepreneurship is a dynamic and uncertain process because entrepreneurs are likely to face resource shortages (financing, knowledge, operating assets, and legitimacy), rapid change, uncertainty (newness of the environment, shortage of information), and surprises (Baum & Locke, 2004). To successfully manage this dynamic and uncertain process, learning is vital for entrepreneurs (Smilor, 1997), or as Minniti and Bygrave (2001, p. 7) put it: “entrepreneurship is a process of learning, and a theory of entrepreneurship requires a theory of learning.” Thus, to understand successful entrepreneurship it is important to understand entrepreneurial learning. Research suggests that entrepreneurs are action-oriented (Frese, 2009) and that much of the learning that takes place during the creation and development of a business is experiential in nature (Minniti & Bygrave, 2001; Morris, Kuratko, Schindehutte, & Spivack, 2012; Pittaway & Cope, 2007; Politis, 2005; Wang & Chugh, 2014). Entrepreneurs learn by engaging in various entrepreneurial tasks such as designing a product, negotiating with suppliers, developing a marketing strategy, or launching a new product on the market. Thus, skills and knowledge required for successful entrepreneurship can often only be acquired by actively engaging in entrepreneurial tasks (Jenkins, 2012; Politis, 2005). However, not every entrepreneurial task is successful. Engaging in entrepreneurial tasks results in positive and negative experiences, which form the basis for developing entrepreneurial knowledge (Minniti & Bygrave, 2001). Previous research has specifically focused on learning from negative experiences (e.g., Cope, 2005; Shepherd, 2003; Yamakawa & Cardon, 2015) because such experiences generally result in greater learning than successful experiences do (Frese & Keith, 2015; Minniti & Bygrave, 2001; Sitkin, 1992).

### 1.3 The goal of this dissertation

In this dissertation I seek to develop a better understanding of *when* and *how* entrepreneurs learn from negative experiences. Negative experiences can be rich sources of feedback to entrepreneurs regarding the effectiveness of their entrepreneurial actions (Jenkins, 2012). Negative experiences signal that “something needs to be done” (Frese & Keith, 2015, p. 21.13) and thus instigate change in processes or underlying assumptions (Cope, 2005). This can provide unique learning opportunities that cannot be gained from success alone (Jenkins, 2012; Minniti & Bygrave, 2001; Rerup, 2005). Similarly, the lean start-up method builds upon the idea that negative experiences provide opportunities for improving entrepreneurs’ knowledge (Blank, 2013). However, research suggests that negative experiences might result in emotional, motivational, and financial costs that interfere with entrepreneurial learning (Frese & Keith, 2015; Hofmann & Frese, 2011; Mantere, Aula, Schildt, & Vaara, 2013; Shepherd & Cardon, 2009; Uy, Sun, & Foo, 2017; van Gelderen, van de Sluis, Lidewey, & Jansen, 2005). These studies suggest that negative experiences consume attentional resources that are necessary for entrepreneurial learning (Kanfer, Ackerman, Murtha, Dugdale, & Nelson, 1994). Thus, while some studies suggest that negative experiences foster entrepreneurial learning, others have not found a positive relationship. Learning therefore seems to be a potential but not a certain outcome of negative experiences (Jenkins, 2012). This dissertation seeks to unravel some of the contradictions presented in the existing research by examining *when* entrepreneurs learn from negative experiences. I seek to answer the following question:

- 1) Under what conditions do entrepreneurs learn from negative experiences?

In addition to understanding when entrepreneurs learn from negative experience, I am interested in *how* negative experiences exert a positive effect on entrepreneurial learning. There is scarce research focusing on process mechanisms between negative experiences and entrepreneurial learning. In a theoretical study, Petkova (2009) has focused on cognitive processes to deepen our understanding of how negative experiences influence entrepreneurial learning. Other research has emphasized the importance of emotional processes (e.g., Shepherd, 2003; Shepherd & Cardon, 2009). Building on these studies and on psychological theories, I seek to develop a better understanding of *how* psychological mechanisms convert negative experiences into entrepreneurial learning. I seek to answer the following question:

- 2) Which psychological mechanisms facilitate entrepreneurial learning from negative experiences?

#### **1.4 A note on definitions**

In the process of my research I subtly changed the definitions and names of some of the main constructs in order to be more precise and in line with the existing literature. In the following I briefly explain the changes.

*Negative experiences, problems, and failures.* In this dissertation I focus on problems and failures as two forms of negative experience that entrepreneurs may encounter. A problem is a modest negative experience and defined as the non-attainment of an entrepreneurial goal that happens within the entrepreneurial process (e.g., mistakes, setbacks, errors) (Cannon & Edmondson, 2005; Cope, 2011; Frese & Zapf, 1994; McGrath, 1999). Failure, meanwhile, is defined differently in Chapter 2 compared to Chapters 3 and 4. In Chapter 2, failure has a broad definition as the non-attainment of an entrepreneurial goal. With this definition I do include smaller failures that happen within the entrepreneurial process (e.g., problems, mistakes, setbacks) as well as large failures (e.g., discontinuity of business, bankruptcy) that end the entrepreneurial process. However, in the process of my research, I came to the conclusion that it is more adequate to use two different terms to describe: (a) the non-attainment of goals *within* the entrepreneurial process, and (b) the non-attainment of goals *ending* the entrepreneurial process. Thus, in Chapters 3 and 4 I refer to problems as the non-attainment of goals within the entrepreneurial process (e.g., errors, mistakes, setbacks) and I refer to failures as the non-attainment of goals ending the entrepreneurial process (e.g., bankruptcy, business closure).

*Error management mindset and error mastery orientation.* In this dissertation I examine the effect of a positive error handling strategy on entrepreneurial learning from problems and failures. To describe this positive error handling strategy, I use different terms in Chapter 2 compared to Chapters 3 and 4. In Chapter 2, I refer to error management mindset, whereas in Chapters 3 and 4 I refer to error mastery orientation. Error management mindset and error mastery orientation refer to the same concept. In the process of research I decided to use the latter term because it features more frequently in the literature (e.g., van Dyck et al., 2010).

#### **1.5 Outline of this dissertation**

Chapter 1 provides a general introduction to this dissertation. This is followed by Chapter 2, which develops the Emotion-Motivation-Cognition (EMC) model of entrepreneurial learning from failure. The definition of failure used in this chapter includes smaller failures that happen within the entrepreneurial process (e.g., problems, mistakes,

setbacks) as well as large failures (e.g., discontinuity of business, bankruptcy) that end the entrepreneurial process. Based on action regulation theory (Frese & Zapf, 1994; Zacher & Frese, 2018), control theories (Carver & Scheier, 1982, 1990), and emotion as feedback theory (Baumeister, Vohs, DeWall, & Zhang, 2007) we<sup>1</sup> develop the EMC model as an integrated theoretical model that explains how entrepreneurs learn from failure. The EMC model integrates emotional, motivational, and cognitive processes that facilitate entrepreneurial learning from failure. Further, the model includes error mastery orientation as an important moderator. Error mastery orientation describes a positive error handling approach in which errors are accepted as part of human life and viewed as an important source for learning (Keith & Frese, 2005; van Dyck, van Hooft, Gilder, & Liesveld, 2010). We believe that error mastery orientation helps to explain why some entrepreneurs learn from failure while others do not.

Chapter 3 builds upon the EMC model from Chapter 2 and tests the proposition that error mastery orientation is an important moderator in the relationship between problems and entrepreneurial learning. The chapter focuses on entrepreneurial learning from problems which refer to frequent negative experiences that happen within the entrepreneurial process. The theoretical model is tested using a longitudinal design with one baseline measurement and 11 weekly measurement waves with a sample of nascent entrepreneurs that started a business as part of an entrepreneurship training program. The results reveal that error mastery orientation moderates the relationship between problems and entrepreneurial learning in such a manner that problems exert a positive effect on entrepreneurial learning for high levels of error mastery orientation but not for low levels. Furthermore, previous research suggests that the knowledge entrepreneurs gain through entrepreneurial learning from problems might not necessarily lead to better business outcomes (Minniti & Bygrave, 2001). It is possible that entrepreneurs adapt their assumptions and behavior after experiencing a problem in a way that is even more incorrect. We therefore investigate how entrepreneurial learning from problems relates to business success. Our results suggest that entrepreneurial learning does indeed have a positive effect on business success.

Chapter 4 further tests the propositions of the EMC model developed in Chapter 2. The chapter offers a more fine-grained analysis of how error mastery orientation facilitates entrepreneurial learning from problems. Based on the EMC model we argue that error

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<sup>1</sup> I use the term “we” throughout the following chapters (Chapters 2, 3, and 4) because several co-authors contributed to each chapter.

mastery orientation exerts its positive effect on entrepreneurial learning from problems through increasing a set of self-regulatory skills. The theoretical model is tested with two measurement waves with a sample of small business owners. The results reveal that the effect of error mastery orientation on entrepreneurial learning from problems is mediated by a set of self-regulatory skills: emotion control, learning goal orientation, and metacognition.

Chapter 5 concludes this dissertation with a general discussion of the theoretical and empirical Chapters 2, 3, and 4 and highlights practical implications that can be drawn from findings of this dissertation.



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## **2. A psychological model of learning from entrepreneurial failure: Integrating emotional, motivational, and cognitive factors<sup>2</sup>**

Entrepreneurship provides an excellent context for exploring autonomous learning in the workplace (Cope, 2005; Frese & Keith, 2015). Entrepreneurship offers a work context with high levels of autonomy and great freedom in decision-making. Entrepreneurs can proactively engage in learning activities, such as deliberate practice (Baron & Henry, 2010; Unger, Keith, Hilling, Gielnik, & Frese, 2009), to enhance their knowledge and skills, or learn as a result of experimentation and associated failures. In the literature on entrepreneurship, the latter aspect has attracted considerable attention. This is because scholars consider learning from failure a crucial feedback mechanism that substantially enhances entrepreneurs' understanding of their domain (Cope, 2011; Frese, 2009; Frese & Gielnik, 2014; Shepherd, 2003). Entrepreneurial failure represents a clear signal that something went wrong and motivates entrepreneurs to reflect on what to change (Cope, 2005; Frese & Keith, 2015; Sitkin, 1992). Furthermore, entrepreneurship involves exploration and innovation with uncertain outcomes, which means that entrepreneurial failures occur frequently (Cope, 2005; Frese & Keith, 2015; Sitkin, 1992). The feedback role, combined with the relative high frequency, may explain why scholars, as well as entrepreneurs themselves have embraced the idea of learning from entrepreneurial failure (Cope, 2011; Minniti & Bygrave, 2001; Petkova, 2009; Shepherd, 2003).

In this chapter, we focus on learning from entrepreneurial failure as a prevalent form of entrepreneurs' autonomous learning. We define entrepreneurial failure as non-attainment of an entrepreneurial goal (Cannon & Edmondson, 2005; Cope, 2011; Frese & Zapf, 1994; McGrath, 1999). We note that we depart from other definitions of entrepreneurial failure, which define entrepreneurial failure as discontinuity of ownership or bankruptcy (Shepherd, 2003; Singh, Corner, & Pavlovich, 2007; Ucbasaran, Shepherd, Lockett, & Lyon, 2013; Zacharakis, Meyer, & DeCastro, 1999). We take a broader perspective on failures and include so called "small" failures (Cope, 2011; Sitkin, 1992), such as failures to acquire necessary resources for the start-up, in addition to large failures such as discontinuity of businesses and bankruptcy. We take this broader conceptualization because entrepreneurs do

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not only learn from the ultimate termination of their ventures (e.g., bankruptcy) but also from failed actions throughout the entrepreneurial process. The entrepreneurial process comprises several phases, such as identifying and developing a business opportunity, acquiring resources to implement the business opportunity, launching a new business, and managing growth and survival (Baron, 2007; Frese & Gielnik, 2014). Entrepreneurs have to pursue various goals to accomplish each phase and failing to achieve one of those goals is a potential source of learning. This broader conceptualization allows us to provide a more general understanding of learning from failure during the entire entrepreneurial process.

The topic of learning from entrepreneurial failure has gained increased attention in literature and it is now at a crossroads. Scholars have long recognized that learning from entrepreneurial failure requires a better understanding of several psychological factors. In particular, previous studies have focused on three different factors: emotion (Shepherd, 2003, 2004; Shepherd & Cardon, 2009; Shepherd, Covin, & Kuratko, 2009; Shepherd & Haynie, 2011; Shepherd, Patzelt, & Wolfe, 2011), motivation (Carsrud & Brännback, 2011; Shepherd & Cardon, 2009; Shepherd et al., 2011; Yamakawa, Peng, & Deeds, 2015), and cognition (Cope, 2003, 2005; Cope & Watts, 2000; Minniti & Bygrave, 2001; Petkova, 2009). These studies have added greatly to our understanding of learning from entrepreneurial failure; however, the studies have mainly focused on a single factor and neglected to examine how the emotional, motivational, and cognitive mechanisms operate together. As such, the literature lacks an integrated conceptual model that could be used to cumulate empirical evidence and theory on this topic (Dubin, 1969; Sitkin, 1992; Suddaby, 2014)

The purpose of this chapter is to introduce the emotion-motivation-cognition (EMC) model of entrepreneurial failure. We develop a conceptual model that describes and explains how emotions, motivation, and cognitive processes operate in an integrated model. The starting point of our conceptual development is the notion that failure implies non-attainment of goals and represents a clear signal providing a form of feedback for entrepreneurs (Cope, 2005; Sitkin, 1992). We therefore draw on action regulation and control theories (Carver & Scheier, 1982, 1990; Frese & Zapf, 1994; Zacher & Frese, 2018; Zacher, Hacker, & Frese, 2016), which discuss the important role of feedback in goal pursuit. Moreover, these theories deal with attainment and non-attainment of goals, as well as the underlying cognitive, motivational, and emotional mechanisms of successful and unsuccessful goal pursuit. Action regulation and control theories therefore provide useful theoretical lenses to explain learning after failure. Furthermore, we build on emotion as feedback theory, which discusses the important role of emotions as a feedback mechanism for learning and changing behavior

(Baumeister et al., 2007). Emotion as feedback theory is useful for our model because according to emotion as feedback theory, negative emotions signal that people’s actions were not successful, which motivates them to reflect on their actions thus leading to new conclusions and insights.

The basic assumption of our EMC model is that learning from entrepreneurial failure is the result of a process that involves negative emotional reactions, which trigger motivational processes. In turn, the motivational processes are important to explain the cognitive processes resulting in learning, as shown in Figure 2.1. We integrate findings from the literature on entrepreneurial failure to corroborate our model. In addition, we include the concept of error management mindset in our model. Error management mindset involves an acceptance of errors as part of human life and the belief that errors are an important source of learning (Frese & Keith, 2015). Error management mindset helps resolve some of the complexities and opposing effects in learning from entrepreneurial failure, which have been identified in previous research. Specifically, previous research noted that entrepreneurial failure leads to immediate as well as long-term emotional reactions, and these reactions have different functions in the learning process (Shepherd, 2003; Shepherd et al., 2011). Furthermore, previous research discussed possible negative and positive motivational reactions to entrepreneurial failure, which can facilitate or impede learning (Ucbasaran et al., 2013). Our discussion of the model openly acknowledges these contradictory effects because we believe these complexities can be better understood by considering error management mindset as a moderator of the relationships between entrepreneurial failure, emotions, motivation, and cognitions.

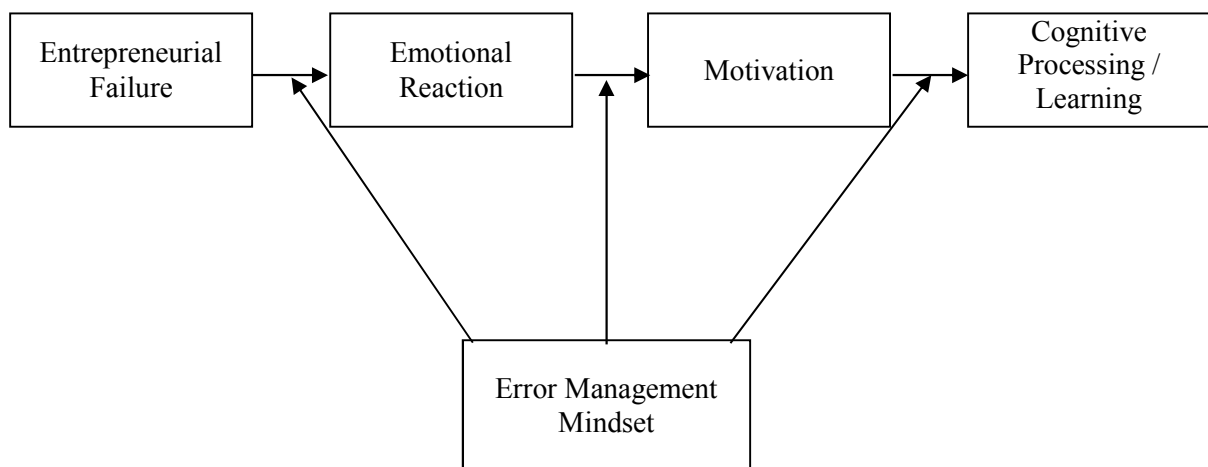


Figure 2.1 The Emotion-Motivation-Cognition (EMC) model of learning from entrepreneurial failure

The EMC model contributes to literature on the autonomous learning of entrepreneurs in at least three ways. First, the model pushes the general research agenda from a fragmented discussion on emotion, motivation and cognition involved in entrepreneurial failure toward an integrated discussion. This discussion seems timely since scholars are increasingly considering the interaction of psychological processes after failure and their impact on the learning process of entrepreneurs (Cope, 2011; Petkova, 2009; Shepherd, 2003; Shepherd & Cardon, 2009; Ucbasaran et al., 2013). We contribute to these approaches by being more explicit about the flow of effects from emotions to motivation and cognitive processing. Note, however, that the flow of effects as indicated in Figure 2.1 does not exclusively indicate a causal step-by-step phenomenon. Second, we build on action regulation and control theories to discuss the positive function of negative emotions (Carver & Scheier, 1990; Frese & Zapf, 1994). This means that our model is partially in contrast to current perspectives that view negative emotional reactions as detrimental to learning of entrepreneurs (Shepherd, 2003; Shepherd & Cardon, 2009). Third, we argue that error management mindset is an important moderator in the process leading from entrepreneurial failure to learning. Error management mindset constitutes a contingency factor that influences whether or not entrepreneurs are successful in learning from entrepreneurial failure. Error management mindset is an important construct in I/O-psychology (Frese & Keith, 2015) but its moderating function has not yet been discussed in the entrepreneurship literature (see Ucbasaran et al., 2013). Our chapter thus extends current theoretical perspectives on contingency factors influencing whether or not entrepreneurs may benefit from entrepreneurial failure.

Before proceeding, it is important to state that our model is a starting point for future research that could examine in more detail the direct and indirect effects between failure, emotions, motivation, and cognition. In the following sections, we discuss that failure leads to negative emotions and negative emotions in turn impact motivation. In addition, we present theories that regard motivation as a direct outcome of failure without considering the intermediate mechanism of negative emotions (i.e., action regulation theory Frese & Zapf, 1994). Thus, Figure 2.1 gives a general overview presenting all psychological factors important in the process of learning from failure without scrupulously delineating all possible direct and indirect effects.

## **2.1 The Emotion-Motivation-Cognition (EMC) model**

### **2.1.1 Entrepreneurial failure and emotional reactions**

The first step in our model is the step from failure to emotional reaction. In general, failure leads to negative emotions (Baumeister et al., 2007; Carver & Scheier, 1990; Frese & Zapf, 1994). To understand how negative emotions influence the process of learning from entrepreneurial failure, we have to distinguish between immediate and long-term negative emotional reactions and between the positive and negative functions of negative emotions. According to control theory (Carver & Scheier, 1990), failures have an immediate effect on people's negative emotions. Failure means non-attainment of a goal. In the terminology of control theory, this means that there is an abrupt drop in the rate of progress towards the goal resulting in negative emotions, such as frustration, anxiety, or doubt (Carver & Scheier, 1990). Similarly, action regulation theory (Frese & Keith, 2015; Frese & Zapf, 1994) and emotion as feedback theory (Baumeister et al., 2007) hold that failures are negative events evoking an immediate negative emotional reaction, for example in terms of anger, fear, worry, or sadness. Also the literature in the entrepreneurship domain is quite consistent in suggesting that entrepreneurial failure is associated with an intense negative emotional reaction, such as panic, despair, and distress (Shepherd, 2003, 2004; Shepherd & Cardon, 2009; Shepherd et al., 2009; Shepherd & Haynie, 2011; Ucbasaran et al., 2013).

Given that failures lead to negative emotions, the question is whether immediate negative emotions are functional or dysfunctional in the process leading to learning. The typical answer is that negative emotions are dysfunctional. A self-regulatory perspective suggests that dealing with negative emotions ties up resources that cannot be allocated to working on the task or to cognitive processes important for learning (Kanfer, Ackerman, & Heggestad, 1996; Kanfer et al., 1994). Negative emotions, such as fright and anger, can divert scarce information processing capacity from processing information about the failure to dealing with the negative emotions (Kanfer et al., 1996). Furthermore, being preoccupied with negative emotions might delay actions to correct the failure, which may aggravate the negative consequences of failures leading to further detrimental effects on people's performance (Frese & Keith, 2015). Similarly, the entrepreneurship literature has mainly highlighted the detrimental consequences of negative emotions. For example, negative emotions can interfere with the processing of information, such that entrepreneurs focus too strongly on the negative emotions rather than on reflecting about the underlying causes of the failure (Shepherd, 2003; Shepherd & Cardon, 2009). Furthermore, negative emotions narrow

the scanning for information leading to rigidity and deadlock (Staw, Sandelands, & Dutton, 1981). From our discussion follows that negative emotions are dysfunctional and have to be controlled. Accordingly, entrepreneurship researchers have emphasized the importance of emotion control after failure (i.e., keeping negative emotions at bay) in order to recover and learn from the experience (Byrne & Shepherd, 2015; Cope, 2011; Shepherd, 2004).

However, we argue that negative emotions also have a positive function in the process leading to learning. Negative emotions represent feedback indicating the occurrence of a failure. Action regulation theory (Frese & Zapf, 1994) holds that failures disrupt automatic processing and prompt people to shift to a more conscious and deliberate mode of processing. When encountering failure, people stop and think about the reasons for the failure, which eventually facilitates learning (Ivancic & Hesketh, 2000). However, it is important to note that failure does not automatically lead to learning. Negative emotions play a crucial role for detecting a failure and pausing to reflect on the failure. Control theory (Carver & Scheier, 1990) posits that a discernible shift towards negative emotions causes people to interrupt their ongoing course of action and consciously assess the current situation. According to control theory, it is not the failure per se but the discernible shift towards negative emotions that is necessary to detect failures and learn from them (Carver & Scheier, 1990). This is also in line with emotion as feedback theory (Baumeister et al., 2007), which holds that negative emotions after failure are feedback indicating a deficit in the current course of action. The recognition of the deficit and the elicitation of negative emotions stimulate cognitive processing, which results in learning. Negative emotions direct attention to the failure prompting people to cognitively process and explore the failure (Baumeister et al., 2007). It follows from our discussion that negative emotions fulfill an important mediating function in the process of learning from failure. Negative emotions are signals that trigger conscious and reflective processing after failure. Accordingly, entrepreneurship research has suggested that significant, discontinuous events (e.g., a serious crisis), which evoke a strong negative emotional reaction, are particularly beneficial for learning (Cope, 2003). Immediate negative emotions thus also have a positive function in the process of learning from entrepreneurial failure.

In addition to the immediate emotional reaction, it is important to discuss the long-term negative emotional reactions following failure. We conceptualize long-term emotional reactions as enduring emotions that sustain over several weeks or even months after failure. Enduring negative emotions include, for example, grief, worry, shame, or guilt (Shepherd & Cardon, 2009; Shepherd et al., 2009; Shepherd et al., 2011). Scholars building on action

regulation theory have discussed the possible effect of failure on long-term emotions noting that negative self-evaluative cycles after failure may lead to self-doubt and continuous dissatisfaction (Frese & Keith, 2015). In the entrepreneurship literature, long-term emotions have received particular attention. Specifically, grief after failure is a predominant topic (Shepherd, 2003; Shepherd & Cardon, 2009; Shepherd et al., 2009; Shepherd & Haynie, 2011; Shepherd et al., 2011). Grief is an enduring negative emotional response capable of triggering behavioral, experiential, and physiological consequences (Shepherd, 2003). In the entrepreneurship literature, grief has been introduced as an umbrella term involving several emotional reactions, such as anger towards others (e.g., debtors, competitors, and the economy), as well as guilt and self-blame, which may cause the feeling that oneself has failed instead of the entrepreneurial venture (Shepherd, 2003, 2004; Ucbasaran et al., 2013). It is important to discuss grief in the process of learning from failure because of its negative effects on motivation and learning. The negative emotions associated with grief, such as regret, worry, and disappointment, may prompt entrepreneurs to constantly work through and revisit the events that led to failure (Shepherd, 2003). This may result in rumination, which has detrimental effects on entrepreneurs' functioning (Shepherd et al., 2011). Rumination means repetitively and passively focusing on the causes and consequences of distressing events (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Rumination leads to becoming fixated on problems and not taking action (Nolen-Hoeksema et al., 2008). Furthermore, rumination may exacerbate negative emotions because people dwell on their negative thoughts leading to an escalation of negative emotions (Nolen-Hoeksema et al., 2008). As a result, rumination is associated with difficulty concentrating and experiencing a lack of energy (Nolen-Hoeksema et al., 2008). From our discussion it follows that long-term negative emotions, such as grief, interfere with constructive problem solving and functional behavior, which eventually impairs learning from failure.

This discussion shows that it is important to distinguish between immediate and long-term negative emotional reactions and between functional and dysfunctional effects of negative emotions. The immediate and long-term negative emotions have different effects on entrepreneurs' motivation in the process of learning from failure. In the section on the moderating effect of error management mindset, we will discuss how error management mindset functions as a contingency factor enhancing the positive consequences and mitigating the negative consequences of failure.

### **2.1.2 Emotional reactions and effects on motivation and cognitive processing**

In our model we outline a relationship from emotional reaction to motivation. In the previous section, we argued that negative emotions after failure could be functional or dysfunctional for learning. In this section, we discuss in more detail the potential negative and positive effects of negative emotions on entrepreneurs' motivation in the process of learning from failure. This means that failure may have both a motivating and demotivating effect on entrepreneurs' cognitive processing of the failure. We first discuss the demotivating effect and then the motivating effect. In the section on the moderating effect of error management mindset, we discuss under which conditions entrepreneurs become motivated or demotivated after failure and experiencing negative emotions.

Negative emotions that people experience after failure include self-doubts and dissatisfaction (Bandura, 1989a; Carver & Scheier, 1990; Wood, Kakebeeke, Debowski, & Frese, 2000). These feelings discourage people and reduce their self-efficacy, which has detrimental effects on their motivation (Bandura, 1991). Self-efficacy reflects people's confidence in their competencies to perform a task (Bandura, 1989a). Self-efficacy has a motivational function insofar as it influences people's effort and persistence (Bandura, 1989a). People who evaluate failure and the negative emotional reaction as a lack of ability to perform certain actions are less motivated to engage in similar actions in the future (Bandura, 1991). Furthermore, lower self-efficacy decreases people's openness to experience, which in turn reduces their likelihood of learning from failure (Bandura, 2012; LePine, Colquitt, & Erez, 2000). Also, people who experience self-doubts and lower self-efficacy become more erratic in their analytical thinking (Bandura, 1989b; Wood & Bandura, 1989). As a result, they are more likely to draw wrong conclusions and thus learn less or wrong lessons from failure.

Failure and associated emotions of self-doubt may also result in helplessness while mastery experiences inoculate against helplessness (Frese & Fay, 2001; Ucbasaran et al., 2013). Helplessness means passivity and amotivation that interferes with adaptive responding to an external negative event (Abramson, Seligman, & Teasdale, 1978). People become helpless if they experience feelings of uncontrollability and incompetence (i.e., doubts about their competencies), which results in motivational and cognitive deficits (Abramson et al., 1978). Motivational deficits include retardation in initiating action; cognitive deficits include retardation in learning new responses (Abramson et al., 1978). Helplessness and the associated motivational and cognitive deficits is thus a phenomenon that helps to explain why



some people are less likely to learn after failure. Indeed, several entrepreneurship scholars have theorized about the negative role of helplessness suggesting that helplessness substantially hinders learning from entrepreneurial failure (Byrne & Shepherd, 2015; McGrath, 1999; Petkova, 2009; Shepherd, 2003; Ucbasaran et al., 2013).

It is also possible to develop our argument via the opposite of helplessness. The opposite of helplessness is personal initiative (Frese & Fay, 2001). Personal initiative is motivated behavior characterized by being self-starting, proactive, and persistent (Frese & Fay, 2001). Research has shown that experiencing positive emotions is positively related to showing personal initiative (Fay & Sonnentag, 2012). Personal initiative in turn is associated with seeking opportunities to learn and engaging in learning activities (Frese, Kring, Soose, & Zempel, 1996; Sonnentag, 2003). Accordingly, entrepreneurship researchers have argued that entrepreneurs, who show higher personal initiative, are more likely to actively look for information and use setbacks as a source of feedback and learning (Glaub, Frese, Fischer, & Hoppe, 2014). Thus, failure and associated negative emotions may have a negative effect on learning through reducing entrepreneurs' personal initiative.

Besides the demotivating effect of failure and negative emotions on motivation and learning, it is also possible to argue for a positive effect of failure and negative emotions on motivation and learning. Specifically, control theory (Carver & Scheier, 1990) suggests that negative emotional reactions indicate that goal progress is inadequate and that there is a discrepancy between the current state and the standard people seek to accomplish. As a result, people increase their effort to reduce the discrepancy (Carver & Scheier, 1990). This means that failure and negative emotional reactions may increase people's motivation. Similarly, emotion as feedback theory considers negative emotions as a motivator that prompts people to act in ways that restore their mood (Baumeister et al., 2007). People seek a neutral or positive emotional state and therefore, negative emotions increase people's motivation to change or improve their situation (Baumeister et al., 2007). Furthermore, emotion as feedback theory (Baumeister et al., 2007) holds that negative emotional reactions motivate people to cognitively analyze the conditions that resulted in failure. Stronger emotions lead to higher motivation to engage in effortful cognitive processing of the failure. Emotions provide feedback about the adequacy of people's actions and, consequently, about the adequacy of their current knowledge and understanding. People then extract a lesson and modify their rules for how to act in similar situations. Emotions thus facilitate learning for future behavior through motivating people to reconsider their current knowledge (Baumeister et al., 2007).

The motivating function of failure has also been discussed by action regulation theory – however, without explicitly conceptualizing negative emotions as a possible mediating mechanism (Frese & Keith, 2015; Frese & Zapf, 1994). Action regulation theory holds that learning is the result of a process in which individuals, who are engaged in goal-oriented behavior, receive feedback on their actions (Frese & Zapf, 1994; Zacher & Frese, 2018). Failure provides particularly useful feedback because it indicates that a goal has not (yet) been reached. The discrepancy between goal and actual situation motivates change and initiates a process of thoughtful reflection on the causes of the failure, which is the basis for learning (Frese & Zapf, 1994; Zacher & Frese, 2018).

The positive function of failure and negative emotions for motivation and learning has also been described in the entrepreneurship literature. McGrath (1999) discussed the motivating function of reactance. Reactance is a response to restrictions on freedom that motivates people to regain their freedom (Brehm, 1966). Failure constitutes a form of loss of freedom because people experience losing control over achieving the desired outcome. Therefore, reactance may set in after failure, which means that entrepreneurs may become more motivated to accomplish a goal after experiencing failure (McGrath, 1999). Additionally, entrepreneurs, who show reactance, oftentimes develop a strong urge to improve their competencies and master a domain (Cardon & McGrath, 1999). This implies that failure may increase entrepreneurs' motivation to learn. Similarly, Welter (2005) described how feelings of defiance might motivate entrepreneurs to reflect on the current situation and reorient their businesses after experiencing setbacks and external pressures. Reflection and reorientation indicate that a learning process has taken place. These studies demonstrate a positive motivating function of negative emotions facilitating learning from entrepreneurial failure.

### **2.1.3 Cognitive processing and learning**

In this section, we discuss the type of cognitive processing motivated by failure that is particularly useful for learning and producing new insights. Specifically, we discuss deeper-level processing, which involves reflective and systematic thinking. Furthermore, we discuss different domains in which entrepreneurs can improve their knowledge as a result of learning from entrepreneurial failure.

*Deeper-level processing.* Entrepreneurs learn from entrepreneurial failure by cognitively processing the situation (Frese, 2007). In general, people prefer automatic and stereotypical responses rather than putting high effort into cognitive processing (Frese, 2007;

Taylor, 1981). Automatic and stereotypical responses allow people to develop routines and habits, which make everyday actions more efficient and less energy consuming. Successful actions indicate goal-achievement and are likely to be repeated; over time, successful actions become routinized requiring little cognitive processing (Frese, 2007; Minniti & Bygrave, 2001). Successful actions thus do not instigate effortful cognitive processing. People engage in effortful cognitive processing, only if there is good reason to do so (Frese, 2007). A possible reason is unsuccessful action, such as entrepreneurial failure. Entrepreneurial failure signals that something went wrong. It disrupts the usual flow of action. Entrepreneurial failure is a negative surprise (Cannon & Edmondson, 2005) that attracts attention to the situation (Frese & Keith, 2015). Entrepreneurial failure plays an important role for learning because it instigates deeper-level processing. By drawing attention to the situation, entrepreneurial failure stops automatic processing and stimulates a more conscious and effortful cognitive processing (Frese & Keith, 2015; Keith, 2011).

Deeper-level processing means reflective and systematic thinking about information provided by the entrepreneurial failure. Deeper-level processing involves effortful reflection on the causes and consequences of entrepreneurial failure. It means critically questioning underlying assumptions, routinized heuristics, and automatized actions (Cope, 2005). Deeper-level processing enables entrepreneurs to develop a better understanding of why the entrepreneurial failure occurred and how to prevent it next time (Frese & Keith, 2015). Moreover, learning through deeper-level processing is adaptive and easier to transfer to other situations because it is based on cognitive insights (Frese, 2007). Action regulation theory emphasizes the role of deeper-level processing for learning (Frese & Keith, 2015; Frese & Zapf, 1994). Deeper-level processing helps entrepreneurs to develop and update their mental models (Frese, 2009; Frese & Zapf, 1994). A mental model is the cognitive representation of the current situation, the goal state, and the transformation of the current situation into the goal state (Frese & Zapf, 1994). Good mental models help entrepreneurs to carry out actions effectively (Frese, 2009; Frese, Beigel, & Schoenborn, 2003; Frese & Zapf, 1994, 1994). However, mental models are rigid, which means that it is difficult to modify them (Frese & Zapf, 1994). Because of the rigidity, it requires effortful cognitive processing in terms of deeper-level processing to change the mental model. Effortful cognitive processing leads to a reintellectualization, which allows people to break the rigidity and modify their mental model (Frese & Zapf, 1994). Entrepreneurial failure and negative emotions increase motivation and thus provide the necessary energy for engaging in effortful deeper-level processing. Additionally, in case of failure, the chosen way has shown to be

ineffective. As a result, entrepreneurs might pursue an explorative search for new actions (Politis, 2005). This might lead to new insights for further improving the mental model (Frese & Keith, 2015). Thus, entrepreneurial failure facilitates deeper-level processing and developing mental models for more effective actions in future.

*Knowledge domains.* Entrepreneurial failure provides a learning opportunity to acquire knowledge in different domains. Entrepreneurial failure is a disruptive experience, which triggers deeper-level processing. This deeper-level processing is not constrained to acquiring specific knowledge about the situation at hand, but might also affect learning in various knowledge domains. In general, Frese and Keith (2015) have suggested that failure leads to learning in three domains. First, failure leads to new knowledge about the aspects of one's own actions (or inactions), which may have caused the failure. This new knowledge may help prevent such failure in the future. Second, failure may lead to a better understanding of the environment. People learn about conditions in the environment that lead to failure and about possible actions to deal more adequately with those conditions in future. Third, failure may help people learn how to deal with errors. These are skills in emotion control, which form an important aspect of self-regulation (Frese & Keith, 2015; Kanfer et al., 1994). In a similar vein, Cope (2005, 2011) distinguishes between four knowledge domains that entrepreneurs can improve in after failure: oneself, the venture (and its demise), network and relationships, and general venture management. We discuss Cope's (2005, 2011) conceptualization of knowledge domains in more detail because of our focus on learning from failure in the field of entrepreneurship.

The first knowledge domain is learning about oneself. Learning from entrepreneurial failure might lead to changes in the self in terms of advancing one's self-concept, developing a positive mindset towards failures, and increasing skills in emotion regulation. First, entrepreneurial failure can be a transformative experience that challenges existing mental models about the current situation and also leads to profound changes in the concept about oneself (Cope, 2011). Specifically, through learning from entrepreneurial failure, entrepreneurs acquire knowledge about their strengths and weaknesses, skills, abilities, attitudes, and beliefs (Cope, 2011). Moreover, entrepreneurs can learn about self-management and self-motivation (Stokes & Blackburn, 2002). Second, entrepreneurial failure can have an effect on developing a positive mindset towards failures (Frese & Keith, 2015). Entrepreneurs who experience multiple failures may learn that failure is a normal aspect of the highly uncertain entrepreneurial process (Cope, 2011). As a result, entrepreneurs may develop a greater acceptance and even a more positive attitude towards failure because they come to

appreciate the positive outcomes of failure (Politis & Gabrielsson, 2009). Third, entrepreneurs can learn how to deal with negative emotions that are the result of experiencing entrepreneurial failure (Frese & Keith, 2015). Particularly, entrepreneurs may develop higher levels of emotion control, i.e., self-regulatory processes to keep negative emotional reactions at bay (Keith & Frese, 2005). Studies on error management training proposed that being confronted with errors in training situations increases emotion control of the participants (Keith & Frese, 2005).

The second knowledge domain is learning about the venture (and its demise). Entrepreneurs might learn about the strengths and weaknesses of the business and identify reasons why the entrepreneurial failure occurred (Cope, 2011). This may include getting to know about the effectiveness of the business model in addressing customer needs, as well as the timing of placing a product in the market (Cope, 2011). This is in line with Stokes and Blackburn (2002), who showed that entrepreneurs learned lessons especially in the area of marketing, such as how to find and keep customers. Entrepreneurs also learned that failure is mostly a result of multiple smaller crises within and surrounding the venture instead of an isolated event that leads to the failure (Cope, 2011).

The third knowledge domain is learning about networks and relationships. Entrepreneurs might learn about the nature and management of relationships (Cope, 2011). This learning outcome refers to networks and relationships within the organization, as well as to relationships with external partners. Regarding internal relationships, Cope's (2011) findings indicate that particularly learning about the management of relationships within the leadership team are crucial for the success or failure of an entrepreneurial venture. Regarding external networks and relationships, entrepreneurs report on the important role of the venture capitalists as well as cooperation partners (Cope, 2005, 2011). In this vein, Stokes and Blackburn (2002) showed that learning about how to build good and trusting relationships is an important learning outcome resulting from entrepreneurial failure.

The fourth knowledge domain is learning about general venture management. Entrepreneurs might learn about how to effectively manage and control businesses in general (Cope, 2011). This knowledge is not only useful for the current business but can be transferred to other businesses as well. Deeper-level processing instigates a process in which entrepreneurs do not only reflect on what the entrepreneurial failure means for the specific task or the current business. Entrepreneurs might go beyond that and challenge their knowledge and mental models about how to effectively manage a business in general. Particularly, knowledge regarding the management of operations, marketing, managing

people, and finance are important in this regard (Stokes & Blackburn, 2002). Furthermore, Stokes and Blackburn (2002) showed that entrepreneurs who had to close down their business due to poor performance believed that the lessons learned from the business failure would help them to manage the next business more effectively.

## **2.2 The moderating effect of error management mindset**

We now turn to describing the error management perspective and then outline individual differences in error management mindset and its implications for learning from entrepreneurial failure. Specifically, we suggest that error management mindset is an important moderator of the different links in the EMC model. The error management perspective posits that errors and failures cannot be completely prevented (Frese & Keith, 2015). Working simultaneously on multiple or difficult tasks requires attentional resources and attentional resources are limited (Wickens, 1991). Thus, individuals are bound to make errors and fail, especially in uncertain situations like starting a new business (Frese, 2009; Frese & Keith, 2015). Therefore, a strategy purely focusing on error prevention has its limits (Frese & Keith, 2015). Error prevention means that people try to avoid or prevent errors and failures. However, errors and failures cannot be prevented completely. Even in routine tasks, people frequently commit errors (Frese & Keith, 2015). As errors will constantly occur, the question is what people could do after an error has occurred (van Dyck, Frese, Baer, & Sonnentag, 2005).

People differ in their usual response towards errors and failures (van Dyck et al., 2010). A concept that explains how people respond to errors and failures is error management mindset. An error management mindset involves having a positive attitude towards errors and failures. To understand error management mindset, it is important to distinguish between errors and their consequences (van Dyck et al., 2005). Individuals with an error management mindset focus on the consequences once an error has occurred. Specifically, they focus on reducing negative error consequences and increasing positive error consequences (Frese & Keith, 2015). Having an error management mindset involves accepting that errors are inevitable and that errors could be turned into something positive (Frese & Keith, 2015). This does not mean that errors are desirable but inevitable with possible positive aspects attached to it. Error management mindset also implies that errors are quickly detected and corrected, negative error consequences are minimized, occurrence of the same errors is reduced in the future, and positive error consequences such as learning, performance and innovation are increased (Frese & Keith, 2015; van Dyck et al., 2005). Furthermore, individuals with an

error management mindset emphasize the positive function of errors and regard them as a chance to learn and improve their mental models. They acknowledge that errors have a positive function because they provide informative feedback. They also understand that errors and failures are signals that the chosen way of doing something proved ineffective and therefore challenges the adequacy of their mental models related to the situation (Frese & Keith, 2015).

### **2.2.1 Error management mindset and emotional reactions**

Entrepreneurs experience negative emotions after entrepreneurial failure. These negative emotions may vary in intensity. We argue that an error management mindset influences the intensity of negative emotions after experiencing entrepreneurial failure. Regulating the intensity of negative emotions is important to maximize the functional and minimize the dysfunctional effects of negative emotions. As we discussed earlier, negative emotions are dysfunctional insofar as they divert attentional resources and interfere with information processing, but also functional insofar as they are a signal directing attention to the failure and initiating the process of learning from failure. In order to minimize the negative consequences and maximize the positive consequences, it is important to keep the negative emotions at a functional level. High-intensity negative emotions absorb all resources and consequently, people are fully preoccupied with dealing with the negative emotions. Low-intensity negative emotions might not reach the threshold of signaling that something went wrong. Therefore, it is important to achieve an optimal level of negative emotions.

The intensity of negative emotions after experiencing an entrepreneurial failure depends on the entrepreneurs' ability to control their emotions. Emotion control is a skill that involves self-regulatory processes to keep negative emotions at a functional level (Kanfer et al., 1996; Keith & Frese, 2005). Functional level describes a level of negativity in which negative emotions still attract the entrepreneur's attention to the situation, while simultaneously not consuming all attentional resources so that cognitive processing would become inefficient (Shepherd, 2003). An error management mindset facilitates emotion control (Keith & Frese, 2005). An error management mindset helps entrepreneurs to regulate their negative emotions after an entrepreneurial failure because they have a positive perspective on errors and failure (Keith & Frese, 2005). Framing entrepreneurial failure as a learning opportunity reduces the intensity of negative emotions resulting from entrepreneurial failure. Individuals with an error management mindset are able to keep their negative emotions at a functional level of negativity. Thus, even though they experience negative

emotions after an entrepreneurial failure, they do not become overwhelmed by negative emotions because they are able to regulate these emotions by seeing positive aspects of entrepreneurial failure. Empirical research supports this line of reasoning. Error management mindset increased emotion control in the context of an error management training (Keith & Frese, 2005). Similarly, a positive attitude towards failure reduced negative emotions after having experienced project failure (Shepherd et al., 2011). We therefore suggest that error management mindset moderates the relationship between entrepreneurial failure and emotional reactions, such that entrepreneurs with high error management mindset experience an optimal level of negative emotions that minimizes the negative consequences (e.g., only little distraction and interference) while maximizing the positive consequences (e.g., strong signal that something needs to be changed or improved).

### **2.2.2 Error management mindset and motivation**

We described that failure and negative emotions can have both motivating and demotivating effects in the process of learning from entrepreneurial failure. Failure and negative emotions can lead to reduced self-efficacy and helplessness. On the other hand, failure and negative emotions signal a discrepancy, which indicates that more effort and a thorough cognitive analysis of the situation are needed. These differential effects may depend on entrepreneurs' error management mindset. As outlined before, emotions provide feedback (Baumeister et al., 2007). Depending on how the entrepreneur interprets this feedback, negative emotions can have positive or negative effects on motivation. If entrepreneurs view negative emotions as a sign of lack of competence, the entrepreneur might feel helpless and frustrated, which reduces motivation (Frese & Keith, 2015). People with an error management mindset are more likely to view errors and failure as inevitable; errors and failure are not viewed as a lack of competence but as a source of learning, an opportunity to develop mastery, and achieving higher subsequent performance (Frese & Keith, 2015). Therefore, entrepreneurs with high error management mindset are less likely to experience helplessness or a drop in self-efficacy after failure and negative emotions.

Furthermore, entrepreneurs with an error management mindset are more likely to make use of the motivating function of negative emotions. These entrepreneurs should not interpret negative emotions as personal failure but as valuable feedback that the goal has not yet been accomplished (Frese & Keith, 2015). This means they are more likely to become motivated because of the perceived discrepancy between the current situation and the standard that they want to achieve. Moreover, error management mindset predicts developing



higher personal initiative because it implies having a sense of control over the situation (Frese & Fay, 2001). Error management is thus a factor that helps to explain why entrepreneurs are more likely to show personal initiative instead of helplessness after failure. We therefore suggest that error management mindset moderates the effect of failure and negative emotional reactions on motivation, such that entrepreneurs with an error management mindset become more motivated. The higher motivation should translate into more effort and higher personal initiative after experiencing failure and negative emotions.

### **2.2.3 Error management mindset and cognition**

We also argue that whether entrepreneurial failure serves to motivate entrepreneurs to engage in deeper-level cognitive processing depends on error management mindset. The extent of cognitive processing may vary from briefly thinking about the causes of the entrepreneurial failure to extensively challenging one's own assumptions about how to effectively launch and manage a business. Error management mindset should influence whether entrepreneurs engage extensively or only superficially in cognitive processing because it is related to engaging in metacognition (Keith & Frese, 2005). Metacognition describes the ability to self-monitor one's cognitive functions (Cannon-Bowers, Rhodenizer, Salas, & Bowers, 1998). Metacognition is a process that involves planning, monitoring, evaluation and revision of one's goal progress (Frese & Keith, 2015; Keith & Frese, 2005). Research shows that metacognition increases cognitive processing and learning (Ford, Smith, Weissbein, Gully, & Salas, 1998; Frese & Keith, 2015). Moreover, metacognition is especially beneficial in learning environments that provide little external structure or guidance (Frese & Keith, 2015; Schmidt & Ford, 2003). This means that metacognition is particularly effective in the entrepreneurship context, which is characterized as being unstructured and providing little guidance (Frese & Gielnik, 2014). We argue that entrepreneurs with an error management mindset are more likely to engage in metacognition, which implies that they think more extensively and deeper about the actions that resulted in failure. Consequently, they are more likely to revise and improve their mental models about how to be successful in entrepreneurship. Furthermore, error management mindset implies that entrepreneurs see failures as a possibility to develop and learn, thus stimulating a process of conscious and effortful thinking about the failure situation, causes of failure, and failure consequences. In this process, entrepreneurs compare new insights against existing assumptions in order to update and develop their mental models (Frese, 2007). Thus, entrepreneurs with an error management mindset are more likely to use the motivation

aroused by the entrepreneurial failure for effortful, deeper-level processing. We therefore suggest that error management mindset moderates the relationship between motivation and cognitive processing, such that entrepreneurs with high error management mindset are more likely to engage in deeper-level processing with beneficial effects on gaining new knowledge about themselves, their venture, their networks, and venture management in general.

### **2.3 Concluding discussion**

In this chapter, we proposed an integrated conceptual model of learning from entrepreneurial failure. The resulting EMC model describes learning from entrepreneurial failure in a psychological process model including emotional, motivational, and cognitive factors. Furthermore, we outline the moderating role of error management mindset in the EMC model. Taken together the EMC model pushes the discussion on learning from entrepreneurial failure from a fragmented discussion on emotion, motivation, and cognition towards a more integrated conceptual model. The EMC model is a starting point. As such, it is not intended as an all-inclusive model; rather it is meant as a model that is broad enough to allow the inclusion of more concepts and a detailed specification of direct and indirect effects in the future. In the following, we outline some implication of the EMC model for future research and discuss its practical implications.

#### **2.3.1 Future research**

An important aspect in the EMC model is the positive effect of a negative emotional reaction in the process of learning from entrepreneurial failure. More specifically, we have described that negative emotions may have both dysfunctional and functional effects in the learning process. Negative emotions may absorb resources (dysfunctional effect) but also direct attention and signal a discrepancy (functional effect). By distinguishing these two effects of negative emotions, we move towards a more balanced perspective on the role of negative emotions in the learning process in comparison to some previous models (Shepherd, 2003; Shepherd & Cardon, 2009). Nevertheless, our understanding of the functional and dysfunctional effects of emotions remain underexplored (Ucbasaran et al., 2013). To explore the differential effects, future research may examine moderators to explain under which conditions the negative emotional reaction has functional or dysfunctional effects. In this chapter, we have taken one step in this regard by connecting the literature on learning from entrepreneurial failure with the literature on error management (Frese & Keith, 2015; Frese & Zapf, 1994; van Dyck et al., 2005; van Dyck et al., 2010) and the potential moderating role of error management mindset (Frese & Keith, 2015). Future research should confirm the

effects of an error management mindset in the learning process empirically. Moreover, we think that other factors, such as (entrepreneurial) self-efficacy (Bandura, 1989a; McGee, Peterson, Mueller, & Sequeira, 2009) which buffers negative emotions when experiencing setbacks (Ozer & Bandura, 1990), may play an important role here and thus offer a promising avenue for future research.

Furthermore, we theorized that an error management mindset acts as a moderator in all three relationships within the EMC model. Future research should examine each of the proposed moderating effects. An entrepreneur's error management mindset could be operationalized with the error orientation questionnaire (Rybowiak, Garst, Frese, & Batinic, 1999), as well as the related concepts of an error mastery orientation and error aversion orientation (van Dyck et al., 2010). For example, Funken (2016) examined error mastery orientation and error aversion orientation in the context of an entrepreneurship training. She found that failure resulted in learning in the case of high error mastery and low error aversion orientation. These findings provide a promising starting point for future research to explain under which conditions failure leads to learning in entrepreneurship.

The EMC model also opens up opportunities for future research by touching upon the role of time (Gielnik, Barabas et al., 2014; Mitchell & James, 2001), particularly in understanding emotional effects. We have described how negative emotions have both immediate effects, as well as long-term effects within the learning process. Whereas the immediate effects of negative emotions may be both negative (e.g., diverting scarce information processing capacity), as well as positive (e.g., increasing motivation to change), the long-term effects are mostly negative (e.g., negative self-evaluative cycles after failure, self-doubt). As such, we consider the role of time to be important in determining the differential effects of negative emotions in the learning process. For example, it is important to consider the time lag between failure and emotions when theorizing about the effect of negative emotions on learning. Measuring negative emotions early after failure may yield a positive effect whereas measuring negative emotions late after failure may yield a negative effect. Thus, contradictory findings might be resolved by incorporating time as a factor in models explaining learning from failure. To disentangle the differential effects, scholars could engage in more longitudinal empirical studies to improve the understanding of the role of time. Although this may be challenging, we agree with others (Cope, 2011; Shepherd et al., 2011) that time seems to be a particularly important aspect in the process of learning from entrepreneurial failure.

Furthermore, we see opportunities for future research in investigating the role of entrepreneurs' motivation in the learning process. The EMC model goes beyond other models on this topic (Cope, 2011; Minniti & Bygrave, 2001; Petkova, 2009; Shepherd & Cardon, 2009) by drawing particular attention to the central role of motivation in the learning process. We have argued that motivation is an important mechanism for understanding when entrepreneurial failure initiates deeper-level processing (Frese & Keith, 2015) or higher level learning (Cope, 2003, 2005, 2011). However, motivational processes remain a widely neglected area in understanding learning from entrepreneurial failure (Carsrud & Brännback, 2011; Yamakawa et al., 2015). We have argued that self-efficacy, helplessness, and personal initiative might be constructs that help to explain why entrepreneurs are more or less likely to learn from entrepreneurial failure. Examining these constructs as mediators would enhance our understanding of the underlying processes of entrepreneurs' learning after experiencing failure.

Related to the previous point, we propose that a promising area for future research is to investigate the influence of an error management culture. An error management culture involves shared norms and practices to cope with errors and failures to avoid negative error consequences (e.g., grief, bankruptcy), as well as to increase positive consequences (e.g., learning, improved business model) (van Dyck et al., 2005). In an error management culture, it is accepted that people fail and failures are valued for their potentially positive consequences. We expect that such a culture has an influence on entrepreneurs' error management mindset because individuals orient their own behavior toward the norms of their community (Eagly & Chaiken, 1993; Gronewold & Donle, 2011). Therefore, we suggest that an error management culture has a positive effect on entrepreneurs' error management mindset with positive effects within the learning process. Future research could therefore adopt a multi-level perspective examining the effect of error management culture on individual entrepreneurs' learning.

### **2.3.2 Implications for practice**

The EMC model holds important implications for educating aspiring entrepreneurs. Specifically, we suggest that educators should include specific training modules designed to increase entrepreneurs' error management mindset. To train an error management mindset, we suggest that educators may follow two approaches. First, they could design general entrepreneurship modules (e.g., entrepreneurial finance, entrepreneurial marketing) in the form of error management training (Frese & Keith, 2015; Keith & Frese, 2005, 2008). Error

management training makes use of errors to convey specific skills. More specifically, trainees are encouraged to make errors because learning from errors helps them to acquire skills and knowledge (Frese & Keith, 2015; Keith & Frese, 2005, 2008, 2010). In error management trainings, errors and failures are framed as something positive through instructions such as “Errors are a natural part of the learning process!” or “The more errors you make, the more you learn!” (Heimbeck, Frese, Sonnentag, & Keith, 2003; Keith & Frese, 2005). A meta-analysis indicates the effectiveness of error management training in comparison with error avoidant training (Keith & Frese, 2008). Error management training positively affects entrepreneurs’ attitudes towards errors and increases participants’ metacognition and emotion control (Keith & Frese, 2005). Accordingly, this offers the possibility to indirectly influence participants’ error management mindset through using the didactical approach of error management training.

A second approach that we suggest is to design training programs that directly influence entrepreneurs’ error management mindset. A good starting point is to develop training contents based on the facets of error orientation as outlined in Rybowski et al. (1999). Error orientation deals with the attitude about errors and coping with errors (Keith & Frese, 2005; Rybowski et al., 1999). It includes facets such as error competence, learning from errors, error risk taking, error strain, and error anticipation (Rybowski et al., 1999). We think that training these facets should have a positive effect on entrepreneurs’ error management mindset and thus facilitate learning from entrepreneurial failure. Such training would fit particularly well within entrepreneurship curricula that have adopted the lean startup approach (Blank, 2013; Ries, 2011). The lean startup approach puts a particular emphasis on learning from failure in entrepreneurial education and it has been increasingly adopted by leading business schools such as Stanford, Harvard, Berkeley, and Columbia (Blank, 2013).

Moreover, we suggest that the EMC model has also an important implication for organizers of discussion-based events geared toward entrepreneurial communities, which examine entrepreneurial failure in order to learn from it (Failure Institute, 2016). Such discussions allow founders to learn through experiential stories. In this way, failure can add to their understanding about entrepreneurship because experiencing failure can provide critical insights when such experiences are discussed openly and honestly (Failure Institute, 2016). We suggest that the EMC model of learning from entrepreneurial failure can help communicate why this type of discussion is beneficial for entrepreneurs and entrepreneurial communities. For example, since these events promote open communication about failure, they may help to foster an acceptance of failure, instead of stigma (Cope, 2011). Such events

may also help struggling entrepreneurs overcome their grief (Shepherd, 2003) by normalizing failure as a recurring part of entrepreneurship (Shepherd et al., 2011). Therefore, we suggest that policy makers who are interested in fostering entrepreneurship may consider promoting such events as one important aspect in promoting overall entrepreneurial activity.

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### **3. How can problems be good? The important role of entrepreneurial learning and error mastery orientation<sup>3</sup>**

#### **Abstract**

Some scholars argue that problems lay the foundation for future success, whereas others point out that problems reduce success. Our theoretical model focuses on entrepreneurial learning and error mastery orientation to explain how and when problems lead to venture progress. We tested our theoretical model using a longitudinal design with one baseline measurement and 11 weekly measurements. Analyses were based on 1,016 lagged observations from 168 individuals, who participated in entrepreneurship trainings in Uganda and Kenya. Results suggested that entrepreneurial learning is a mechanism explaining how problems lead to venture progress. This indirect effect depended on entrepreneurs' error mastery orientation.

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<sup>3</sup> This chapter is currently in first round of revise and resubmit at *Entrepreneurship: Theory and Practice* as Funken, R., Gielnik, M. M., & Foo, M.-D. (2017). How can problems be good? The important role of entrepreneurial learning and error mastery orientation. *Manuscript under review at Entrepreneurship: Theory and Practice*.

### 3.1 Introduction

Nascent entrepreneurs face numerous problems due to uncertainty, ambiguity, scarcity of resources, and information asymmetry (Lamine, Mian, & Fayolle, 2014; McMullen & Shepherd, 2006). Interestingly though, practitioners and scholars have not condemned problems but praised problems to be a key success factor for entrepreneurs. Popular literature has suggested that failure is a “gift” (Dillon, 2011, p. 86) that can lead to “glorious comeback” (Hann, 2013, p. 34). Entrepreneurs around the world are sharing stories about things that went wrong at events such as FailCon (FailCon, 2017) or Fuckup Nights (Fuckup Nights, 2017) to learn from each other’s problems. Further, policy makers and venture capitalists have advocated embracing problems and failure (European Commission, 2015; Isenberg, 2011) and adopting a tolerant, flexible and open-minded attitude towards entrepreneurs who have failed (Cope, Cave, & Eccles, 2004). Similarly, scholars have argued that problems can be a vital source of learning (Cope, 2003; McGrath, 1999; Minniti & Bygrave, 2001; Petkova, 2009; Politis & Gabrielsson, 2009) leading to positive business outcomes (Kim, Kim, & Miner, 2009; Minniti & Bygrave, 2001; Sitkin, 1992). Entire business concepts, such as the lean start-up method, are based on the idea that successful businesses go quickly from problem to problem while iterating and improving the initial ideas (Blank, 2013).

In contrast to the positive notions, scholars have also suggested that problems come with severe costs (Cope, 2011; Frese & Keith, 2015; Shepherd & Patzelt, 2017; Ucbasaran et al., 2013). These costs include the experience of negative emotions, such as anxiety, anger, and shame (Frese & Keith, 2015), which interfere with learning (Cope, 2011; Jenkins, Wiklund, & Brundin, 2014; Shepherd, 2003; Shepherd et al., 2009; Shepherd et al., 2011). Furthermore, problems can decrease entrepreneurs’ self-esteem (Cope, 2011; Mantere et al., 2013; Shepherd & Cardon, 2009) and motivation (Frese & Keith, 2015). The entrepreneur might need to invest time and money to deal with the problem (Hofmann & Frese, 2011). Accordingly, business owners might not necessarily improve their skills when experiencing problems (van Gelderen et al., 2005). Coping with a difficult situation can, in fact, deplete psychological resources and thus hurt venture progress (Uy et al., 2017).

The above discussion shows that the literature has drawn two portraits of the role of problems in entrepreneurship. While some assert that problems can increase success through learning (Kim et al., 2009; Minniti & Bygrave, 2001; Sitkin, 1992), others have pointed to the emotional, motivational, and financial costs associated with problems, that decrease learning



and success (Frese & Keith, 2015; Hofmann & Frese, 2011; Mantere et al., 2013; Shepherd & Cardon, 2009; Uy et al., 2017; van Gelderen et al., 2005).

In this study, we seek to resolve this puzzle of understanding when and how entrepreneurs are able to benefit from problems by taking an action-regulation approach (Frese, 2009; Frese & Zapf, 1994). Building on action-regulation theory is useful because “entrepreneurs’ actions need to be the starting point for theorizing in entrepreneurship” (Frese, 2009, p. 440). Using this approach, we argue that whether or not entrepreneurs learn from problems depends on their orientation on how to act when errors occur. We first argue that entrepreneurs can potentially learn from problems: Problems signal that the chosen way of handling a specific task is ineffective, and may thus lead to changes in underlying assumptions and behavior (Frese & Keith, 2015; Politis, 2005). Thus, if entrepreneurs learn from problems, we expect that entrepreneurs, who have experienced problems, can make use of the new knowledge gained and perform better in the future (Ucbasaran et al., 2013). However, even though entrepreneurial learning can be an outcome of problems, learning from problems is not automatic (Cannon & Edmondson, 2005). Action-regulation theory has suggested that the way entrepreneurs handle errors is crucial for understanding entrepreneurial learning from problems (Frese, 2009; Rybowskiak et al., 1999). Specifically, we offer the view that entrepreneurs high in error mastery orientation, defined as a proactive and positive approach towards handling errors (van Dyck et al., 2010), learn from problems whereas entrepreneurs low in error mastery orientation are less likely to do so. We further put forward that problems increase venture progress through entrepreneurial learning but only for entrepreneurs who have high error mastery orientation (see Figure 3.1).

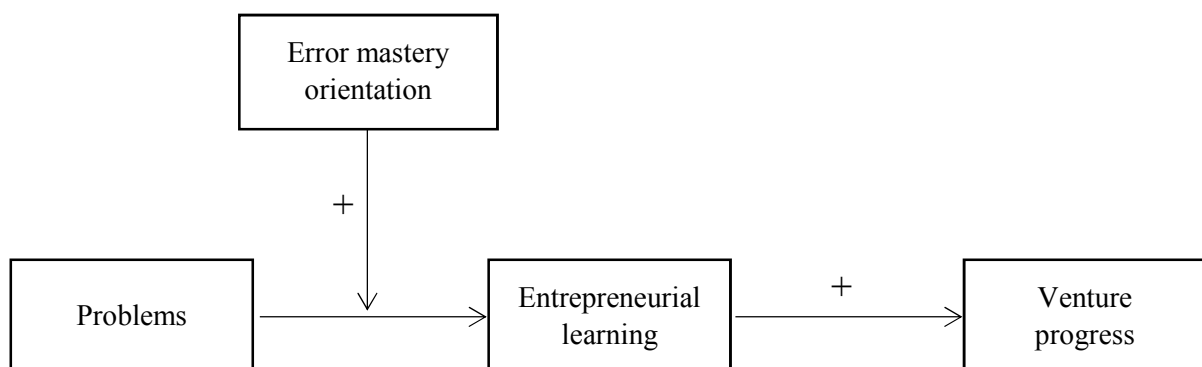


Figure 3.1 The theoretical model of our study: The interplay of error mastery orientation with problems on entrepreneurial learning and venture progress

We contribute to the literature in three ways: First, we add to the literature on entrepreneurial learning. Research has suggested that problems are an opportunity to learn (Cope, 2003; McGrath, 1999; Minniti & Bygrave, 2001; Petkova, 2009; Politis, 2005). However, entrepreneurial learning from problems is not automatic (Cannon & Edmondson, 2005). A far reaching stream of research provides compelling evidence that in many instances entrepreneurs who experience problems find it difficult to learn because psychological resources are used to cope with the emotional situation (Mantere et al., 2013; Shepherd, 2003; Shepherd & Patzelt, 2017; Ucbasaran et al., 2013) hindering learning and venture progress (Uy et al., 2017). Based on action-regulation theory, we introduce error mastery orientation as an important explanation of when entrepreneurs learn from problems. Specifically, our theoretical model holds that entrepreneurial learning from problems happens in cases of high error mastery orientation.

Second, we add to the literature on success factors for nascent entrepreneurs. We reduce some of the ambiguity surrounding the question of whether and how problems increases venture progress. So far the mantra has been “fail fast, fail often” (Donohue, 2015). We argue that merely experiencing problems is not sufficient. We extend this line of reasoning by examining entrepreneurial learning as an underlying mechanism linking problems and venture progress. Adding a learning perspective to the discussion about possible beneficial effects of problems is important. Problems need to trigger learning to have a positive impact on venture progress. Thus, our study suggests that entrepreneurs seeking venture progress should rather follow the mantra “learn fast, learn often.”

Third, we add to the literature by examining entrepreneurial learning and problems during the entrepreneurial process. More specifically, we examine entrepreneurial learning from problems continuously during the entrepreneurial process. Much of the previous research on entrepreneurial learning from negative experiences has focused on business failure in terms of bankruptcy or termination of the business (Byrne & Shepherd, 2015; Shepherd, 2003; Singh et al., 2007; Ucbasaran et al., 2013; Ucbasaran, Westhead, Wright, & Flores, 2010; Yamakawa et al., 2015). This is an important stream of research, as the survival rate of new businesses is rather low and knowledge gained from a failed business might be valuable to prevent failure in the next business. However, less attention has been paid to entrepreneurial learning from problems that happen during the entrepreneurial process. Entrepreneurs frequently experience problems that happen during the entrepreneurial process and are modest in severity such as mistakes, errors, setbacks, and barriers (Seckler, Funken, & Gielnik, 2017; van Gelderen et al., 2005). It is important to understand problems during the

entrepreneurial process as a potential trigger for continuous entrepreneurial learning. We extend current research by showing that problems during the entrepreneurial process provide important learning opportunities for entrepreneurs.

### **3.2 The moderating effect of error mastery orientation on the relationship between problems, entrepreneurial learning, and venture progress**

We define entrepreneurial learning in accordance with Cope (2005) as learning experienced by entrepreneurs during the creation and development of a business. This implies that entrepreneurial learning does not relate to a specific type of learning that could be labelled as “entrepreneurial” but rather refers to the context in which learning takes place (Cope, 2005). We define a problem as a deviation that occurs in the pursuit of a desired goal (Cannon & Edmondson, 2005; Seckler et al., 2017). Entrepreneurs are faced with many problems throughout the entrepreneurial process (Frese, 2009), which provide opportunities for entrepreneurial learning. We believe that focusing on problems is important to gain a better understanding of entrepreneurial learning during the entrepreneurial process. It is important to differ between problems and failures. The literature has used the term failure to refer to two different concepts. First, failure has been used to describe the termination of a business or project (Shepherd, 2003; Singh et al., 2007; Ucbasaran et al., 2013; Zacharakis et al., 1999). Second, failure has also been used to describe what we define as a problem. Failure in this sense does not describe the termination of a business or project but refers to setbacks, critical events, and discontinuous events (Cope, 2003; Minniti & Bygrave, 2001; Politis, 2005; Seckler et al., 2017; Sitkin, 1992; van Gelderen, Thurik, & Patel, 2011). We believe that it is important to distinguish these concepts. Failure (termination of a business) is a rather rare event that might lead to strong negative emotions such as grief (Shepherd, 2003). It is subject to stigmatization (Cardon, Stevens, & Potter, 2011) and does not necessarily require the continuation of business activities. Problems are a frequent event that entrepreneurs need to deal with on a regular basis. Problems might evoke negative emotions such as stress (Frese & Keith, 2015), but will usually not result in strong negative emotions such as grief. Entrepreneurs need to deal with problems immediately to keep the business running. Thus, we differentiate between failure and problems, while acknowledging that these concepts are related. Finally, we define venture progress as the entrepreneur’s subjective appraisal of the venture’s progress towards becoming a viable business venture (Uy, Foo, & Ilies, 2015).

There are several learning theories that explain how individuals learn from problems such as Kolb's (1984) experiential learning theory, Shepherd's (2003) propositions of grief

recovery and Minniti and Bygrave's (2001) dynamic model of entrepreneurial learning. In our study, we base our theoretical arguments on action-regulation theory (Frese, 2009; Frese & Zapf, 1994). We use action-regulation theory because it puts action in the focus and is therefore particularly suitable to study entrepreneurial learning from problems in entrepreneurship. We build on action-regulation theory to argue that problems facilitate entrepreneurial learning (Frese, 2009; Frese & Zapf, 1994). Action-regulation theory posits that there are at least three reasons why problems might promote entrepreneurial learning. First, problems increase attention. Problems are negative surprises that disrupt automatic processing and lead to increased and more conscious attention (Cope, 2003; Frese & Keith, 2015; Sitkin, 1992). The result is a more intensive deeper-level cognitive processing that may lead to new insights and a better understanding, for example about the sources of problems or erroneous actions (Cope, 2003; Keith, 2011; Sitkin, 1992). Second, problems provide information. Problems are a form of negative feedback to the entrepreneur (Frese & Zapf, 1994). They signal that the desired and expected goal has not (yet) been achieved. Problems can reveal incorrect assumptions and signal that 'something needs to be done' or corrected (Frese & Keith, 2015; Politis, 2005; Sitkin, 1992; Ucbasaran et al., 2013). Third, problems instigate an exploration strategy. Politis (2005) argued that problems stimulate entrepreneurial learning through experimentation, i.e., entrepreneurs explore new possibilities through variation, experimentation, and discovery. Increasing variety and expanding the search for alternative actions is a way to better understand the system one operates in (Frese & Keith, 2015; McGrath, 1999; Politis, 2005). Thus, by increasing attention, providing information, and instigating an exploration strategy, problems have the potential to increase entrepreneurial learning.

While experiencing problems is an opportunity for entrepreneurial learning, it is likely that the actual entrepreneurial learning after problems widely varies and not all entrepreneurs equally learn from problems (Byrne & Shepherd, 2015; Fang He, Sirén, Singh, Solomon, & Krogh, 2017; Mueller & Shepherd, 2014). We build on action-regulation theory (Frese, 2009; Frese & Zapf, 1994) to argue that entrepreneur's error mastery orientation influences whether or not problems result in entrepreneurial learning. Error mastery orientation describes a positive approach towards handling errors (van Dyck et al., 2010). Individuals with a high error mastery orientation accept that errors cannot be prevented completely (Frese & Keith, 2015). Therefore, the goal is to minimize negative and maximize positive error consequences such as learning and innovation (Frese & Keith, 2015).

We argue that entrepreneurial learning from problems depends on an entrepreneur's error mastery orientation. We argue that error mastery orientation positively moderates the relationship between problems and entrepreneurial learning for two reasons. First, to learn from problems it is necessary to reflect on reasons for why the problem has occurred (Cannon & Edmondson, 2001; Politis & Gabrielsson, 2009; Sitkin, 1992). A high error mastery orientation should increase cognitive processing in terms of reflecting on the problem because problems are seen as possibilities to learn and develop (Politis & Gabrielsson, 2009; Seckler et al., 2017). Empirical evidence supports the line of reasoning showing that error mastery orientation increases cognitive processing, which in turn increases learning (Keith & Frese, 2005). Second, problems result in negative emotions such as anxiety, anger, or shame (Frese & Keith, 2015) which can adversely affect learning. Negative emotions consume attentional resources and limit or prevent learning (Kanfer & Ackerman, 1989; Shepherd, 2003; Shepherd & Patzelt, 2017). A high error mastery orientation should reduce the negative emotions resulting from problems because people with high error mastery orientation frame errors as a positive learning opportunity (Seckler et al., 2017). This positive aspect of errors should buffer negative emotions that usually result from problems. This assumption is in line with empirical studies that have shown that error mastery orientation increases emotion control (Keith & Frese, 2005).

***Hypothesis 1:** The relationship between problems and entrepreneurial learning is moderated by error mastery orientation, such that the relationship will be stronger when error mastery orientation is high.*

We hypothesize that entrepreneurial learning has a positive effect on venture progress. Several theories suggest that learning is beneficial for performance (e.g. Schroeder, Bates, & Junttila, 2002). According to action-regulation theory, learning is the process of developing and updating mental models (Frese & Zapf, 1994). A good mental model includes knowledge about the situation, opportunities for action, and boundary conditions (Frese et al., 2007). The more adequate the mental model is, the more successful the entrepreneur's action will be (Frese, 2009; Keith & Frese, 2005). Based on a better mental model of the situation, entrepreneurs reduce unsuccessful actions and increase successful actions in the creation and development of their ventures (Frese, 2007). Similarly, Shepherd and Patzelt (2017) argue that entrepreneurial learning changes the actions an entrepreneur takes and thereby improves the chances of venture progress. Past research has shown that problems can lead to generalizable knowledge (Cope, 2003). Entrepreneurs learn about themselves and the venture

(Cope, 2003). Accordingly, we argue that entrepreneurial learning leads to venture progress. Meta-analytical research also provides evidence for a positive effect of entrepreneurial learning on progress (Unger, Rauch, Frese, & Rosenbusch, 2011).

***Hypothesis 2: Entrepreneurial learning is positively related to venture progress.***

The literature suggests that the consequences of problems can be opposing. Some argue for beneficial consequences of problems such as entrepreneurial learning (Kim et al., 2009; Minniti & Bygrave, 2001; Sitkin, 1992). Others argue for detrimental consequences of problems such as emotional, motivational, and financial costs (Frese & Keith, 2015; Hofmann & Frese, 2011; Mantere et al., 2013; Shepherd & Cardon, 2009; Uy et al., 2017; van Gelderen et al., 2005). We seek to unravel this puzzle by adopting an action-regulation perspective (Frese, 2009; Frese & Zapf, 1994). We argue that problems can indeed lead to positive business outcomes under certain conditions. Scholars have reflected on the positive effect of problems on venture success (Kim et al., 2009; Rerup, 2005; Sitkin, 1992). Problems can instigate changes that are necessary to insure the long-term success of a venture (Kim et al., 2009; Sitkin, 1992). Problems signal that an action was unsuccessful and thus instigates processes such as abandoning ineffective routines and implementing better strategies (Parker, 2013). However, we argue that the effect of problems on venture progress is only indirect because problems per se are detrimental for venture progress. We argue that the mediating mechanism through which problems exert a positive effect on venture progress is through entrepreneurial learning. This learning process results in increased venture progress because the entrepreneur makes use of improved knowledge and more effective actions (Frese, 2009; Frese & Zapf, 1994). Further, the effect of problems on venture progress through entrepreneurial learning depends on error mastery orientation. Entrepreneurial learning from problems is not automatic (Cannon & Edmondson, 2005) and depends on error mastery orientation. Error mastery orientation instigates reflection on the causes of the problems (Keith & Frese, 2005; Politis & Gabrielsson, 2009) and reduces negative emotions (Keith & Frese, 2005; Shepherd et al., 2011). Consequently, we hypothesize that problems have a positive effect on venture progress through entrepreneurial learning, but only if error mastery orientation is high.

***Hypothesis 3: There is an indirect effect of problems on venture progress through entrepreneurial learning in cases of high error mastery orientation but not in cases of low error mastery orientation.***

### **3.3 Methods**

#### **3.3.1 Design**

The setting of our study was an entrepreneurship training, which required participants to prepare and launch a micro-business within the course of the training. The core idea of the entrepreneurship training is to actively engage participants in start-up activities. We chose an entrepreneurship training which required the engagement in real start-up activities as the setting of our study because we seek to study entrepreneurial learning from problems during the entrepreneurial process. The entrepreneurial process comprises several phases, such as perceiving and evaluating an opportunity, finding resources to implement the business opportunity, launching a new business, and managing growth and survival (Baron, 2007; Frese, 2009; Frese & Gielnik, 2014). The entrepreneurship training provided a setting in which participants go through the whole entrepreneurial process from identifying an opportunity to starting and managing a micro-business. To capture the entrepreneurial process we followed participants throughout the entrepreneurship training. We conducted a longitudinal study with one baseline measurement before the training and weekly measurements during the 12-week entrepreneurship training. We collected data using questionnaires. Participants of the training filled out a questionnaire before the start of the training (T0 – September 2014) and in each week during the training starting in the second week of the training (T1 to T11 – October to December 2014). Participants filled out the weekly questionnaires (T1-T11) at the beginning of each training session. In total, we had one baseline measurement (T0) and 11 weekly measurement waves (T1-T11).

#### **3.3.2 Entrepreneurship training**

The training consisted of 12 three-hour sessions, which the participants attended weekly. Each week the training covered a different topic to introduce participants to the domains of business administration, entrepreneurship, and psychology. The entrepreneurship training involved starting a business in teams of three to six participants. The aim was to create a business that generates profit within the duration of the training. In the beginning of the course, the teams generated ideas for business opportunities, evaluated them, and eventually exploited one idea. Examples of businesses started by participants were selling flash drives, producing sweets, or offering manicure services. Participants received starting capital of \$100 for investments and expenses, which was to be returned at the end of the training. The pay back rate was 84%. The entrepreneurship training gave participants the

opportunity to go through each phase of the entrepreneurial process. Participants were required to identify an opportunity, gather necessary resources, negotiate with suppliers, manage finances, develop a marketing strategy, and offer their product or service to customers. Research showed that entrepreneurship trainings that involve real-startup activities are especially effective in promoting entrepreneurial action (Barr, Baker, & Markham, 2009; Gielnik, Frese et al., 2015).

### **3.3.3 Sample and procedure**

Our sample consisted of students from two universities, located in Kenya and Uganda. The training was advertised through posters on the campuses and announcements by lecturers during courses. Students from all disciplines were eligible to apply for the training. The training was not part of the regular curriculum and the students did not receive any credits for their studies, but a certificate of participation. Students applied for the training by filling out an application form and the baseline questionnaire (T0 – September 2014).

In Kenya, 459 applicants completed the questionnaire at T0. Due to capacity constraints, we randomly assigned 217 applicants to the training group. To make sure that the training group only included participants who actively took part in the training, we excluded 94 participants from our statistical analyses who attended less than eight out of the 12 sessions<sup>4</sup>. This resulted in a subsample of 119 participants in Kenya. In Uganda, a total of 176 students applied for the training and completed the questionnaire at T0. All applicants, who had completed the questionnaire at T0, were allowed to take part in the training. From these participants, 116 participants attended less than eight out of the 12 sessions and were excluded from our statistical analysis<sup>1</sup>. Our subsample in Uganda consisted of 60 participants.

We combined the two subsamples to form our final sample with data from both universities consisting of 179 participants in total<sup>5</sup>. Because of missing values, we could not use the data of ten participants reducing our sample to 169 participants. Participants filled out a questionnaire every week during the 12-week entrepreneurship training starting in the second week of the training (T1 to T11 – October to December 2014). In total, we gathered

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<sup>4</sup> To test whether the exclusion of participants, who did not attend regularly, affected our results, we also ran all analyses without excluding any participants. The results did not change. The main and interaction effects remained significant. This means that our findings are not biased because of the exclusion of participants. The results from the analyses with the full sample can be obtained from the first author.

<sup>5</sup> As we use the same study design in Uganda and Kenya, we combined the two subsamples to one final sample. However, the patterns of results are similar for each subsample, which means that we could replicate the findings and the theoretical model holds in two different contexts. For details see the additional analyses.



1,264 observations from 169 participants (7.48 observations per participant out of 11 measurement waves). To have a prediction model, we used a design with a lagged data structure. Such a lagged design structure reduces the number of observations that can be used for the analyses because it requires having observations from consecutive weeks. Our final sample in the lagged data structure consisted of 1,016 observations from 168 participants. Of the 168 participants, 64% were male. Regarding their entrepreneurial experience, 24% owned a business before the start of the training (T0), 65% had at least one entrepreneur in the family, and 42% had previously attended a business course.

### 3.3.4 Measures

*Problems.* We measured problems every week during the training (T1-T11) based on Yamakawa et al. (2015) and Yamakawa, Peng, and Deeds (2010). Participants were asked to indicate the extent of problems experienced in the last week in an open-end question (“How many problems or setbacks have you encountered for your business in the last week?”). As the answers were open, this could lead to extreme responses. Kennedy, Lakonishok, and Shaw (1992) proposed several methods on how to deal with extreme responses. We followed their suggestion on “winsorizing,” which involves setting values of extreme observations equal to reasonable values (Kennedy et al., 1992). To avoid outliers and to approximate a normal distribution, we used a cut-off and recoded all responses larger than “5” as “5” (see also Gielnik, Frese et al., 2015; Ucbasaran, Westhead, & Wright, 2008). As a result, 13 out of 1,264 responses were winsorized. Additional analyses without winsorizing produced similar results.

*Entrepreneurial learning.* We measured entrepreneurial learning with four items every week during the training (T1-T11) based on Shepherd et al. (2011). We used their items to measure project-related learning from failure. We excluded one item from the original scale because it did not fit into the context of our study (“I now realize the mistakes that we made that led to the project’s failure”). This item refers to ultimate failure, which was not the focus of our study. The scale consisted of the general stem “In the last week,” followed by four items (“I have learned to better execute a business’ strategy”; “I have improved my ability to make important contributions to a business”; “I have learned to run a business more effectively”; “I improved to “see” earlier the signs that a business is in trouble”). The participants answered all items on 7-point Likert scales ranging from “not at all” to “absolutely.” Cronbach’s alpha ranged from  $\alpha=.90$  to  $\alpha=.96$  within the eleven measurement waves.

*Error mastery orientation.* To measure error mastery orientation, we followed the approach by van Dyck et al. (2010) and based our measure on the error orientation questionnaire (EOQ) (Rybowiak et al., 1999). The EOQ consists of eight subscales. To determine which subscales describe a positive error handling approach (error mastery orientation) we ran an exploratory factor analysis on the eight subscales of the error orientation questionnaire with the sample from Uganda and used the sample from Kenya for confirmatory factor analysis. Our approach is in line with Rybowiak et al. (1999), who stated that “it may be that there are one or more higher-order constructs of error orientation” (p. 20). We used the Kaiser criterion to determine the number of factors, which means that we retained factors with an Eigenvalue greater than one (Kaiser, 1960). The exploratory factor analysis revealed a 2-factor structure. This is consistent with van Dyck et al. (2010), who conceptualized error orientation as having two underlying factors: error mastery orientation and error aversion orientation. Results of the exploratory factor analysis showed, that the first factor, error mastery orientation, included the EOQ subscales learning from errors, thinking about errors, error competence, and communication about errors. The second factor, error aversion orientation, included the EOQ subscales covering up errors, error strain, and error anticipation. The EOQ subscale error risk taking loaded on both factors. To confirm the results from the exploratory factor analysis, we ran a confirmatory factor analysis with the sample from Kenya. The confirmatory factor analysis supported the 2-factor structure with error risk taking loading on error mastery orientation. Model fit was acceptable (RMSEA = .07; SRMR = .06; CFI = 0.93). Note that our theoretical model focuses on error mastery orientation. We therefore used only the factor of error mastery orientation in our statistical analyses. Based on the exploratory and confirmatory factor analyses, our measure of error mastery orientation comprised five EOQ subscales and 21 items (e.g., “After I have made a mistake, I think about how it came about”; “If one wants to achieve at work, one has to risk making mistakes”; “When I make a mistake at work, I tell others about it in order that they do not make the same mistake”). Participants gave their answers on 5-point Likert scales ranging from “not at all” to “very much.” The internal consistency of the error mastery orientation scale was  $\alpha = .90$ .

*Venture progress.* We developed three items to measure venture progress every week during the training (T1-T11) based on Brunstein (1993). The scale has been used to measure venture progress in entrepreneurship (Uy et al., 2015; Uy et al., 2017). The items asked participants to rate their level of agreement with the general stem “In the last week,” followed by the three items “the business significantly developed”, “it has become more likely that the

business will be successful”, and “the business made good progress.” The participants answered all items on 7-point Likert scales ranging from “not at all” to “absolutely.” Cronbach’s alpha ranged from  $\alpha=.90$  to  $\alpha=.97$  within the eleven measurement waves. Although participants provided subjective evaluations of venture progress, these subjective evaluations are important at the early venture stages to motivate entrepreneurs to continue with their ventures instead of giving up their ventures before the ventures have a chance to succeed (Uy et al., 2017).

*Control variables.* We measured the following control variables in the baseline questionnaire (T0): To control for prior experience in entrepreneurship, we asked participants whether they are currently starting a business or have ever started a business in the past (“Entrepreneurial experience”), whether anybody in the family owns a business (“Entrepreneur in the family”), and whether they had taken any business courses prior to the training (“Business courses taken”) (Davidsson & Honig, 2003; Gielnik, Frese et al., 2015; Toft-Kehler, Wennberg, & Kim, 2014). To account for the fact that participants worked in teams, we controlled for team size. We controlled for entrepreneurial self-efficacy and negative emotions because these factors influence entrepreneurial learning and success (e.g. Shepherd, 2003; Shepherd & Cardon, 2009; Shepherd, Haynie, & Patzelt, 2013). Entrepreneurial self-efficacy was measured with 12 items developed by Krauss, Frese, Friedrich, and Unger (2005). The scale was used by Gielnik, Frese et al. (2015) in a similar setting. Negative emotions were measured using six items from the PANAS-X scales (Watson & Clark, 1994). In addition, we controlled for gender (female = 0, male = 1) and the country in which the training took place (Uganda = 0, Kenya = 1). Finally, we included the wave of measurement (T1-T11) as a control variable, to account for any trend effects that occur over time.

### **3.3.5 Method of analysis**

Our study employs a longitudinal design with repeated measures. The analyses are based on 1,016 observations from 168 participants. We created a three-level hierarchical data matrix. Level 1 contained variables that were measured weekly (wave, problems, entrepreneurial learning, and venture progress). Level 2 contained variables that were measured before the training (error mastery orientation and the control variables of entrepreneurial experience, gender, entrepreneur in the family, country, business courses taken, negative emotions, and entrepreneurial self-efficacy). Level 3 contained one control variable that accounted for the nested structure of individuals within entrepreneurial teams

(team size). To account for the dependency in the data due to the repeated measurement design (Bliese & Ployhart, 2002), we used random coefficient modeling (Holcomb, Combs, Sirmon, & Sexton, 2010). Random coefficient modeling can be seen as an extended regression analysis (Holcomb et al., 2010) with additional variance terms for handling dependency in the data.

We incorporated combined lagged effects into our models. Combined lagged effects test the effect of the independent variable at one point in time (T) on the dependent variable at a subsequent point in time (T+1), while controlling for the effect of the dependent variable at the previous point in time (T). This implies that we model change in the dependent variable and can draw stronger inferences of causality because predictor and criteria are temporally separated (Ployhart, Weekley, & Ramsey, 2009; Uy, Foo, & Aguinis, 2009). In addition, testing combined lagged effects is an appropriate procedure to correct for serial dependency in the data (Beal & Weiss, 2003).

In our study, the independent variables are problems (Hypothesis 1) and entrepreneurial learning (Hypotheses 2 and 3), measured multiple times (T1-T11). We tested Hypothesis 1 by regressing the combined lagged effect of entrepreneurial learning (measured at T+1) on the control variables (measured at T0), entrepreneurial learning (measured at T), and the interaction term between problems (measured at T) and error mastery orientation (measured at T0). The interaction term thus reflects a cross-level interaction with error mastery orientation modelled on Level 2 and problems modelled on Level 1 (Aguinis, Gottfredson, & Culpepper, 2013). We tested Hypothesis 2 by regressing the combined lagged effect of venture progress (measured at T+1) on the control variables (measured at T0), venture progress (measured at T), and entrepreneurial learning (measured at T). Hypothesis 3 describes a moderated mediation model. This means that the mediation effect depends on levels of the moderator. More specifically, the effect of problems (measured at T) on venture progress (measured at T+1) through entrepreneurial learning (measured at T) depends on levels of error mastery orientation (measured at T0). We conducted a moderated mediation analysis following the approach by Tein, Sandler, MacKinnon, and Wolchik (2004). This approach requires rescaling the independent variable for different levels of the moderator (one standard deviation below [-1SD] the mean and one standard deviation above [+1SD] the mean (see Aiken, West, & Reno, 1991)). Then, separate mediation analyses were run for each level of the rescaled independent variable. Monte Carlo method was used to obtain confidence intervals for the indirect effects of the mediation analyses (MacKinnon, Lockwood, & Williams, 2004). All models were fitted by restricted maximum likelihood (REML). We used

the statistical software package R with the package “lme4” (Bates, Mächler, Bolker, & Walker, 2014) to run our analyses.

### 3.4 Results

Table 3.1 presents the descriptive statistics and correlations for the study variables. As participants from Kenya and Uganda were included in our study, we tested whether participants from the two countries differed in terms of any measure. We found significant differences for entrepreneurial experience (Kenya = 0.59, Uganda = 0.28,  $p < .01$ ), gender (Kenya = 0.72, Uganda = 0.53,  $p < .01$ ), entrepreneur in the family (Kenya = 0.59, Uganda = 0.75,  $p < .01$ ), business courses taken (Kenya = 0.50, Uganda = 0.24,  $p < .01$ ), team size (Kenya = 5.52, Uganda = 3.97,  $p < .01$ ), negative emotions (Kenya = 1.57, Uganda = 1.82,  $p < .01$ ), entrepreneurial self-efficacy (Kenya = 4.06, Uganda = 3.73,  $p < .01$ ), entrepreneurial learning (Kenya = 5.53, Uganda = 5.29,  $p < .01$ ), and error mastery orientation (Kenya = 4.16, Uganda = 3.97,  $p < .01$ ). We therefore included country as a control variable in our analyses. Note that we also ran separate analyses for each country and demonstrated that the results hold across countries (see additional analyses). This means that our findings are generalizable across countries. Our design also corresponds to an internal replication of findings across two different settings to demonstrate the robustness of results (Open Science Collaboration, 2015).

#### 3.4.1 Test of hypotheses

We calculated four models to test our hypotheses (see Table 3.2). In Model 0 and 1, we used entrepreneurial learning measured in the subsequent wave (T+1) as the dependent variable. In Model 2 and 3, we used venture progress measured in the subsequent wave (T+1) as the dependent variable. We added the respective dependent variable measured in the previous wave (T) as a control variable. Therefore, our models reflect change in entrepreneurial learning (Models 0 and 1) and venture progress (Models 2 and 3).

Hypothesis 1 stated that the effect of problems on entrepreneurial learning is moderated by error mastery orientation. Model 1 shows that the interaction term between problems and error mastery orientation on entrepreneurial learning in the subsequent week was significant ( $\beta = .11, p < .01$ ). Following suggestions by Aiken et al. (1991), we plotted values of entrepreneurial learning for high error mastery orientation (one standard deviation above the mean) and low error mastery orientation (one standard deviation below the mean). Figure 3.2 shows that the relationship between problems and entrepreneurial learning is positive for entrepreneurs displaying high error mastery orientation and negative for

Table 3.1 Descriptive statistics and correlations of study variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Country <sup>a</sup>	0.65	0.48											
2. Entrepreneurial experience <sup>b</sup>	0.48	0.50	0.29**										
3. Gender <sup>c</sup>	0.65	0.48	0.18*	-0.03									
4. Entrepreneur in the family <sup>b</sup>	0.65	0.48	-0.18*	0.19*	-0.11								
5. Business courses taken <sup>b</sup>	0.41	0.49	0.19*	0.22**	-0.03	0.09							
6. Team size	4.98	1.58	0.48**	0.09	0.07	-0.14	0.00						
7. Negative emotions	1.66	0.98	-0.17*	-0.04	-0.07	-0.02	-0.10	-0.10					
8. Entrepreneurial self-efficacy	3.94	0.68	0.27**	0.34**	0.08	0.20**	0.30**	0.09	-0.15+				
9. Problems	1.24	1.24	0.02	0.11	0.10	0.09	0.00	-0.05	0.01	0.04			
10. Entrepreneurial learning	5.45	1.03	0.17*	0.16*	-0.02	0.11	0.05	0.08	-0.17*	0.49**	-0.02 <sup>d</sup>		
11. Venture progress	4.99	1.37	0.03	0.03	0.01	0.13	-0.11	0.03	-0.12	0.24**	-0.12 <sup>d**</sup>	0.63 <sup>d**</sup>	
12. Error mastery orientation	4.09	0.48	0.18*	0.15+	0.05	0.04	0.20*	0.07	-0.32**	0.42**	0.18*	0.35**	0.13

Note: If not specified differently correlation is based on aggregated Level-2 data set with 168 participants; <sup>a</sup> 0 = Uganda, 1 = Kenya; <sup>b</sup> 0 = no, 1 = yes; <sup>c</sup> 0 = female, 1 = male; <sup>d</sup>Based on Level-1 data set with 1,016 observations from 168 participants; + p < .10, \* p < .05, \*\* p < .01

Table 3.2 Prediction model of failure and error mastery orientation on entrepreneurial learning and venture progress

	Entrepreneurial learning (T+1)				Venture progress (T+1)			
	Model 0		Model 1		Model 2		Model 3	
	b	SE	b	SE	b	SE	b	SE
<b>STEP 1: Main effects</b>								
Time	0.03**	0.01	0.03**	0.01	0.01	0.01	0.00	0.01
Country <sup>a</sup>	0.16+	0.10	0.19+	0.10	0.19	0.19	0.16	0.19
Entrepreneurial experience	0.02	0.07	0.02	0.07	0.00	0.11	0.00	0.11
Gender <sup>c</sup>	-0.06	0.07	-0.05	0.07	-0.06	0.11	-0.04	0.11
Entrepreneur in the family <sup>b</sup>	-0.01	0.07	0.02	0.07	0.03	0.11	0.03	0.11
Business course taken <sup>b</sup>	-0.04	0.07	-0.05	0.07	-0.21+	0.11	-0.20+	0.11
Team size	0.01	0.03	0.01	0.03	0.01	0.06	0.01	0.06
Negative emotions	-0.04	0.03	-0.03	0.03	-0.02	0.04	-0.03	0.04
Entrepreneurial self-efficacy	0.29**	0.06	0.28**	0.06	0.25**	0.09	0.19*	0.09
Entrepreneurial learning (T)	0.46**	0.03	0.45**	0.03				
Venture progress (T)					0.43**	0.03	0.38**	0.03
<b>STEP 2: Interaction effect</b>								
Problems (T)	0.01	0.02	0.00	0.02	-0.01	0.03	-0.01	0.03
Error mastery orientation			0.07	0.07	0.00	0.11	-0.03	0.11
Problems (T) * Error mastery orientation			0.11**	0.04	0.02	0.06	0.02	0.06
<b>STEP 3: Main effect</b>								
Entrepreneurial learning (T)							0.15**	0.05
Deviance (-2*LogLik)	2278.90		2278.60		2893.68		2887.97	
Highest VIF <sup>d</sup>	1.58		1.60		1.53		1.70	

Note: Regression coefficients are unstandardized; Number of participants = 168, number of observations = 1,016; <sup>a</sup> 0 = Uganda, 1 = Kenya; <sup>b</sup> 0 = no, 1 = yes; <sup>c</sup> 0 = female, 1 = male; <sup>d</sup> Highest variance inflation factor out of all predictors in the model; + p <.10, \* p <.05, \*\* p <.01

entrepreneurs displaying low error mastery orientation. Similarly, a simple slope analysis revealed that the slope was positive and significant for high error mastery orientation ( $\beta = .06, p < .05$ ). The slope was negative and marginally significant for low error mastery orientation ( $\beta = -.05, p = <.10$ ). The results provided support for Hypothesis 1 that the effect of problems on entrepreneurial learning is positive and stronger for entrepreneurs with high error mastery orientation than for entrepreneurs with low error mastery orientation.

Hypothesis 2 stated that entrepreneurial learning has an effect on venture progress. We analyzed the effect of entrepreneurial learning on venture progress while controlling for the other main and interaction effects. Model 3 shows that the effect of entrepreneurial learning on venture progress in the subsequent week was significant ( $\beta = .15, p < .01$ ). This provided support for Hypothesis 2.

Hypothesis 3 stated that entrepreneurial learning mediates the relationship between problems and venture progress conditional on error mastery orientation. Following the approach by Tein et al. (2004), we tested indirect effects for different levels of error mastery orientation. Table 3.3 displays the conditional indirect effects of problems on venture progress through entrepreneurial learning conditional on error mastery orientation. The conditional indirect effects are displayed at values of error mastery orientation one standard deviation above and below the mean. We used Monte Carlo simulation (MacKinnon et al., 2004) to test

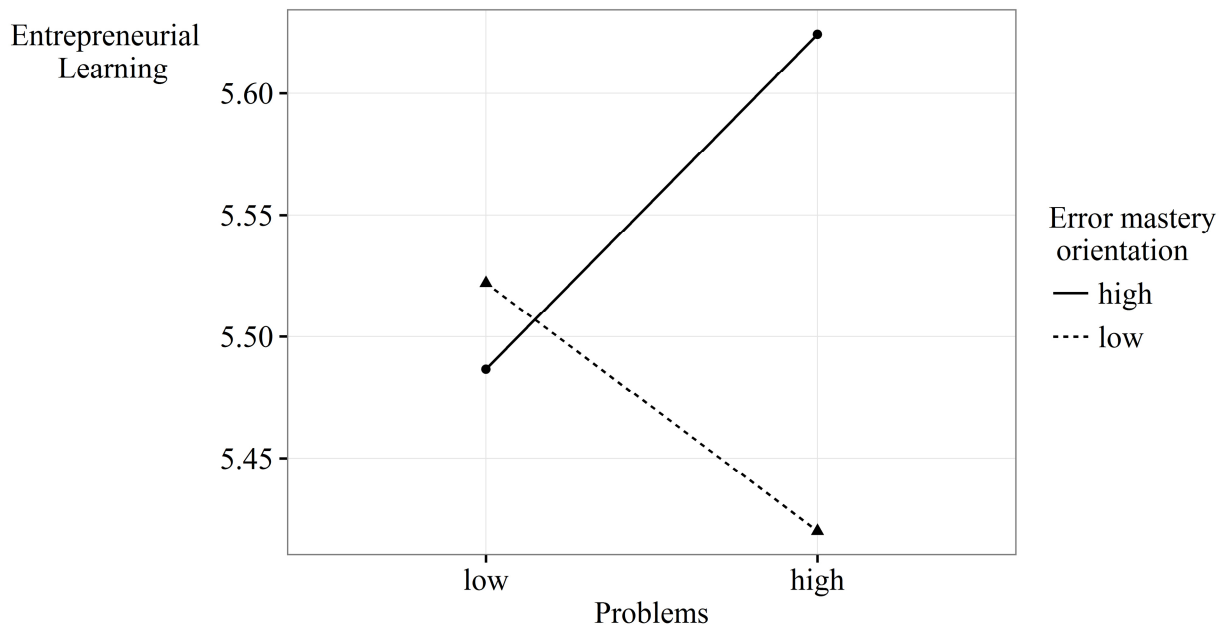


Figure 3.2 The moderating effect of error mastery orientation on the relationship between problems and entrepreneurial learning.

the conditional indirect effects. Results showed that entrepreneurial learning mediates the



relationship between problems and venture progress conditional on error mastery orientation. The indirect effect was marginally significant and positive for high levels of error mastery orientation (indirect effect = .009, 90% Monte Carlo confidence interval = .001 to .018) and not significant for low levels of error mastery (indirect effect = -.008, 90% Monte Carlo confidence interval = -.017 to .000). Thus, the data marginally supported Hypothesis 3.

Table 3.3 Conditional indirect effects of problems and entrepreneurial learning on venture progress for high and low levels of error mastery orientation

Moderator Variable	Entrepreneurial learning				
	Boot indirect effect	Boot SE	95% CI <sup>a</sup>	90% CI <sup>a</sup>	
Error mastery orientation	high (+ 1SD)	0.009	0.005	0.000, 0.021	0.001, 0.018
	medium	0.000	0.003	-0.006, 0.007	-0.005, 0.006
	low (-1SD)	-0.008	0.005	-0.019, 0.001	-0.017, 0.000

*Note:* Number of participants = 168, number of observations = 1,016; <sup>a</sup> Confidence interval of the boot indirect effect

### 3.4.2 Additional analyses

To assess the robustness of our results, we ran separate analyses for each subsample – Kenya and Uganda – to test whether the main and interaction effects are robust and can be replicated in each sample. We used the same analytical approach as for our main analyses. Results showed that the interaction effect between problems and error mastery orientation on entrepreneurial learning was marginally significant in Kenya ( $\beta = .08, p < .10$ ) and significant in Uganda ( $\beta = .17, p < .05$ ). Furthermore, the relationship between entrepreneurial learning and venture progress while controlling for the other main and interaction effects was marginally significant in Kenya ( $\beta = .11, p < .10$ ) and significant in Uganda ( $\beta = .19, p < .01$ ).

### 3.5 Discussion

Entrepreneurs face problems on a regular basis. It is central to understand the role of problems that happen frequently in entrepreneurship (Petkova, 2009). Research has suggested that problems can have beneficial outcomes (Cope, 2003; Kim et al., 2009; McGrath, 1999; Minniti & Bygrave, 2001; Petkova, 2009; Politis & Gabrielsson, 2009; Sitkin, 1992). This seems in contrast to research suggesting that problems come with severe emotional, motivational, and financial costs, which are detrimental for venture progress (Frese & Keith, 2015; Hofmann & Frese, 2011; Mantere et al., 2013; Shepherd & Cardon, 2009; Uy et al.,

2017; van Gelderen et al., 2005). We seek to unravel these contradictions by adopting an action-regulation approach (Frese, 2009; Frese & Zapf, 1994). Using this approach we argued that entrepreneurial learning and error mastery orientation explain how and under what conditions problems can increase venture progress. Our findings indicate that problems are related to venture progress. Entrepreneurial learning transmits the positive effect of problems on venture progress. However, this indirect effect of problems through entrepreneurial learning on venture progress depends on error mastery orientation. Problems are related to entrepreneurial learning and venture progress only for high levels of error mastery orientation.

Our findings have several theoretical and practical implications. First, we add to the literature on learning. Merely experiencing problems is not sufficient for learning to occur. Minniti and Bygrave (2001) have argued that entrepreneurs learn by repeating successful actions and not repeating unsuccessful actions. However, we think that viewing learning from problems as a pure trial-and-error learning experience (Cope, 2011), which is supposed to automatically accumulate knowledge (Minniti & Bygrave, 2001), is inadequate. Often, there is no learning from an unsuccessful action because the number of other unsuccessful actions is nearly infinite (Frese & Keith, 2015). For example, the case of the Ford Edsel describes one of the biggest new-car failure in automotive history (Drucker, 2002). Bringing a new car to the market involves many decisions on, for example, design, technology, and marketing strategy. Simply trying out a different design, technology, or marketing strategy will not guarantee that the next car is a success. We extend previous research by adopting an action-regulation perspective (Frese, 2009; Frese & Zapf, 1994). Our results indicate that error mastery orientation moderates the relationship between problems and learning. This means that models seeking to explain learning from problems need to take into account the moderating effect of error mastery orientation.

Second, we add to the literature on failure in entrepreneurship by differentiating between problems (“failures” within the entrepreneurial process) and failure (termination of a business). The literature has used the term failure to describe different but related concepts. First, the most common use of failure is to describe the termination of a business (Byrne & Shepherd, 2015; Shepherd, 2003; Singh et al., 2007; Ucbasaran et al., 2013; Ucbasaran et al., 2010; Yamakawa et al., 2015). Second, failure is used to describe negative experiences that happen during the entrepreneurial process (Minniti & Bygrave, 2001; Politis, 2005; Seckler et al., 2017; Sitkin, 1992), which we label problems. Previous research has mainly focused on studying entrepreneurial learning related to failure in the sense of the termination of a business (Byrne & Shepherd, 2015; Cope, 2011; Shepherd, 2003; Stokes & Blackburn,

2002). The underlying reasoning is that it requires radical forms of failure to disrupt the usual flow of actions and thus lead to a redefinition of existing mental models on how to successfully run a business (Cope, 2011). In comparison, Sitkin (1992) has argued that it requires intelligent failures, which are modest in severity, for entrepreneurial learning to occur. Our study supports Sitkin's (1992) argumentation and shows that entrepreneurs also learn from more frequent, everyday problems, if they have a high error mastery orientation. Thus, under certain conditions entrepreneurs learn from problems that happen within the entrepreneurial process and are modest in severity, such as mistakes, errors, setbacks, and barriers.

Third, we add to the literature on success factors for nascent entrepreneurs. Our findings indicate that entrepreneurial learning is an important factor linking problems to venture progress. Previous research has shown that under certain conditions entrepreneurial learning can be an outcome of negative experiences (Cope, 2011; Fang He et al., 2017; McGrath, 1999; Shepherd, 2003; Shepherd & Cardon, 2009; Shepherd et al., 2011; Yamakawa & Cardon, 2015). However, so far there is little research linking problems and entrepreneurial learning to venture progress. Even though it makes intuitive sense to assume that entrepreneurial learning leads to venture progress, the literature reports few, but mixed results. Previous research examining this relationship has focused on learning from failure (termination of a business). Research showed that there was no significant performance difference between businesses owned by entrepreneurs who have experienced failure compared to businesses owned by entrepreneurs who have not experienced failure (Ucbasaran et al., 2013; Ucbasaran, Westhead, & Wright, 2006). Taking a more nuanced view on outcomes of failure, Yamakawa et al. (2015) have argued that the effect of failure on venture growth is not linear and depends on attribution of the cause of failure. They showed that up to a certain number of failures, failure was related to subsequent venture growth, if attribution of the cause was internal (Yamakawa et al., 2015). We add to previous research by showing that under certain conditions entrepreneurial learning is an important mechanism explaining how problems exert a positive effect on venture progress. It is not plausible that problems exert a direct positive effect on venture progress, as problems come with emotional, motivational, and financial costs that interfere with venture progress (Frese & Keith, 2015; Hofmann & Frese, 2011; Mantere et al., 2013; Shepherd & Cardon, 2009; Uy et al., 2017; van Gelderen et al., 2005). Our study indicates that problems have an indirect effect on venture progress through entrepreneurial learning.

Fourth, our study offers practical implications. The findings suggest that entrepreneurs should adopt a high error mastery orientation to increase entrepreneurial learning from problems and foster venture progress. Research has shown that an individual's error mastery orientation can be changed through error management training (Keith & Frese, 2005). Entrepreneurship education programs could include features of error management training to increase error mastery orientation. Previous research found that error management instructions are effective in increasing error mastery orientation (Heimbeck et al., 2003; Keith & Frese, 2005). Error management instructions should be designed to reduce negative emotions and emphasize the positive function of errors (e.g., "I have made an error. Great!") (Heimbeck et al., 2003). In addition, instructors can provide participants with opportunities to apply the error management instructions. For example, entrepreneurship education programs could include "problem sessions." Participants could share their problems, reflect on the causes of the problems, and receive feedback on how to handle them. Talking about problems is similar to the idea behind events such as FailCon (FailCon, 2017) or Fuckup Nights (Fuckup Nights, 2017), where entrepreneurs share their stories on what went wrong to learn from each other. Including features from error management training is especially suitable for problem-friendly approaches such as the lean start-up method (Blank, 2013; Seckler et al., 2017). The lean start-up method emphasizes the importance of entrepreneurial learning from problems as a mean to become successful (Blank, 2013). Thus, error management instructions could be an effective complement to the lean start-up method.

### **3.5.1 Strengths and limitations**

A potential limitation of our study is that we asked participants to indicate their amount of problems, entrepreneurial learning and venture progress in the last week. We chose the time lag of one week for problems because we think that participants will experience some problems within a week but not too many so that they can make accurate judgements about the number of problems experienced. Further, we chose the time lag of one week for entrepreneurial learning and venture progress because it takes some time until problems have an effect on entrepreneurial learning (Byrne & Shepherd, 2015) and venture progress. Memory biases may have occurred due to the retrospective reports of problems, entrepreneurial learning, and venture progress (Bolger, Davis, & Rafaeli, 2003). An alternative approach to reduce memory bias would be to use an experience sampling method and ask participants on a daily basis (Uy et al., 2009). However, as van Gelderen et al. (2011) argued, entrepreneurs might be unable to identify more abstract, ongoing problems if asked at

a more frequent basis, such as when providing daily ratings on the number of problems experienced.

Another limitation is that our sample consisted of university students, who started a business as part of an entrepreneurship training. Thus, students started the business to gain entrepreneurial skills and experience. This may question the external validity of our findings. On the other hand, scholars argue that learning is central to entrepreneurship (Corbett, 2005; Minniti & Bygrave, 2001; Wang & Chugh, 2014), which implies that entrepreneurial learning is always essential for the entrepreneurial process regardless of whether the business is started as part of a training or not.

We consider the research design to be a strength of our study. We applied a longitudinal design and tested our model using random coefficient modeling with combined lagged effects (Holcomb et al., 2010). Incorporating combined lagged effects is an appropriate procedure to model change in the dependent variable (Ployhart et al., 2009; Uy et al., 2009). Furthermore, we replicated the findings in two different settings. Davidsson (2016) has called for more replication studies in entrepreneurship research. He argued that we need less reliance on statistical significance testing and more replication studies to develop reliable and robust knowledge about entrepreneurship (Davidsson, 2016). Similarly, scholars from related disciplines such as psychology (Open Science Collaboration, 2015) and management (Bettis, Ethiraj, Gambardella, Helfat, & Mitchell, 2016) called for more replication studies. We responded to these calls by testing our research model in additional analyses with two samples from different countries: Kenya and Uganda.

### **3.5.2 Conclusion**

Our study showed that problems exert a positive effect on venture progress through entrepreneurial learning. However, this effect is contingent on the entrepreneur's error mastery orientation. Only if entrepreneurs have a general positive approach towards errors are they able to turn the information provided by problems into entrepreneurial learning and venture progress.

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#### **4. Taking the bull by the horns: How error mastery orientation facilitates entrepreneurial learning from problems**

##### **Abstract**

Entrepreneurs frequently deal with problems, and such problems bear the potential for learning. The current study examines drivers of entrepreneurial learning from problems. In this study we test propositions of the Emotion-Motivation-Cognition (EMC) model of entrepreneurial learning to examine how entrepreneurs learn from problems. We argue that error mastery orientation exerts a positive effect on entrepreneurial learning from problems through influencing a set of self-regulatory skills related to emotional, motivational, and cognitive processes. We tested our integrated theoretical model using a longitudinal design with two measurement waves. Analyses were based on 52 small business owners from Uganda. The results suggest that error mastery orientation has a positive indirect effect on entrepreneurial learning through emotion control, learning goal orientation, and metacognition. We discuss our results in light of previous findings in the entrepreneurship and error management literature.

#### **4.1 Introduction**

Developing and running a business can be a highly challenging task that involves facing and dealing with numerous problems and setbacks (Frese & Keith, 2015). These problems might include losing an important client, quarreling with employees, facing a liquidity crisis, being unable to resolve a legal issue, or replacing broken hardware. This list could certainly go on and on, as entrepreneurs experience numerous smaller and bigger problems. Accordingly, researchers have noted that problems are a natural part of entrepreneurship (Cope, 2003; Petkova, 2009). Problems are critical situations that may jeopardize the success of businesses and may ultimately lead to business failure.

Although problems can be challenging, researchers have noted that problems are also an important source of learning (Corbett, Neck, & DeTienne, 2007; McGrath, 1999; Minniti & Bygrave, 2001). Problems provide an opportunity for learning because they can be viewed as negative feedback (Frese & Keith, 2015). Negative feedback signals that the chosen way of action is not successful and something needs to be changed (Frese & Keith, 2015). Some researchers have even proposed that problems provide greater learning opportunities than successes because they challenge the entrepreneur's underlying assumptions (Minniti & Bygrave, 2001; Sitkin, 1992).

So far, empirical research on learning from problems has mainly focused on learning from drastic problems or business failure. This research has shown that entrepreneurs learn from closing down a business (Politis & Gabrielsson, 2009), project failure (Shepherd & Kuratko, 2009; Shepherd et al., 2011), and critical incidents (Cope, 2003; Cope & Watts, 2000). Research has paid less attention to the ways in which entrepreneurs learn from problems that are more modest in nature. Such problems, however, occur frequently or even as part of the daily rhythm of developing and running a business (Petkova, 2009; Sitkin, 1992). Modest problems may thus play an important role not because of their intensity but because of the sheer mass of accumulated occurrences. Theoretical models that seek to explain entrepreneurial learning are therefore incomplete if they neglect problems that occur in the daily operations of the business. In this study, we seek to examine factors that facilitate entrepreneurial learning from modest problems in entrepreneurship.

Seckler et al. (2017) have theorized about factors that facilitate learning from problems and developed the Emotion-Motivation-Cognition (EMC) model of entrepreneurial learning. The EMC model suggests that the way entrepreneurs handle errors and problems influences the amount of entrepreneurial learning from problems. Errors and problems are

negative experiences that occur during goal-oriented behavior and imply that a goal has not been reached (Frese & Zapf, 1994; Keith & Frese, 2005). In the EMC model, error mastery orientation plays a particularly important role. Error mastery orientation describes a positive error handling approach that involves actively coping with problems and viewing problems as opportunities for learning and innovation (Frese & Keith, 2015; van Dyck et al., 2010). In this study, we test propositions of the EMC model and examine the effect of error mastery orientation on entrepreneurial learning from problems. According to the EMC model, error mastery orientation facilitates entrepreneurial learning from problems through emotional, motivational, and cognitive processes. More specifically, we argue that error mastery orientation facilitates entrepreneurial learning from problems through enhancing a set of self-regulatory skills: emotion control, learning goal orientation, and metacognition. Problems evoke negative emotions that hinder entrepreneurial learning because they consume attentional resources required for learning (Kanfer et al., 1996; Shepherd, 2003). Thus, scholars have widely acknowledged the important role of emotion control in learning from problems to reduce negative emotions (Byrne & Shepherd, 2015; Fang He et al., 2017; Shepherd, 2003; Shepherd et al., 2013; Shepherd et al., 2011). We further examine learning goal orientation as an important motivational mechanism that helps entrepreneurs to maintain motivation, to actively deal with the problem, and to learn from it. Finally, merely experiencing a problem is not sufficient for learning (Cannon & Edmondson, 2005). Entrepreneurs need to reflect upon the problem in order to learn (Byrne & Shepherd, 2015; Cope, 2011; Frese & Keith, 2015; Yamakawa & Cardon, 2015). We argue that metacognition is a cognitive factor that instigates reflection processes and increases entrepreneurial learning from problems. In sum, we argue that error mastery orientation exerts a positive effect on entrepreneurial learning from problems through emotion control, learning goal orientation, and metacognition.

We advance the literature in three ways. First, we add to the literature on entrepreneurial learning by testing an integrated conceptual model. We argue that error mastery orientation facilitates entrepreneurial learning from problems through enhancing self-regulatory skills. Scholars have suggested that factors that facilitate learning from problems could be understood from a psychological perspective (Seckler et al., 2017; Shepherd, 2003). More specifically, previous studies have focused on various factors to understand learning from problems, such as emotion control (Byrne & Shepherd, 2015; Fang He et al., 2017; Shepherd et al., 2013), self-compassion (Shepherd & Cardon, 2009), grief recovery (Shepherd, 2003; Shepherd et al., 2011), self-efficacy (Shepherd et al., 2009), attribution



(Yamakawa & Cardon, 2015; Yamakawa et al., 2010), and cognitive style (Mueller & Shepherd, 2014). These studies have greatly improved our understanding by identifying core emotional, motivational, and cognitive processes that are relevant for learning from problems. However, these studies have mainly focused on a single factor without developing an integrated conceptual model (Seckler et al., 2017), which is important for advancing theory (Dubin, 1969; Locke & Golden-Biddle, 1997). Integrating existing research helps to highlight the most important factors, to detect interrelationships between factors, and to clarify contradictory findings (Minniti, Zacharakis, Spinelli, & Rice, 2007). In this study, we test propositions from an integrated conceptual model that theorizes about the positive effect of error mastery orientation on a set of self-regulatory skills which in turn facilitate entrepreneurial learning from problems. We integrate emotion, motivation, and cognition through self-regulatory indicators of emotion control, learning goal orientation, and metacognition into a model that more comprehensively describes the factors driving entrepreneurial learning from problems.

Second, we add to the literature on entrepreneurial learning by focusing on modest problems. Much of the literature on learning from problems or negative experiences has focused on business failure in terms of bankruptcy or termination of the business as one form of negative experience (Byrne & Shepherd, 2015; Shepherd, 2003; Singh et al., 2007; Ucbasaran et al., 2013; Ucbasaran et al., 2010; Yamakawa et al., 2015). This is an important stream of research as business failure is a drastic event. However, it is equally important to study entrepreneurial learning from problems that happen during the process of developing and running a business (Funken, 2016). Entrepreneurs frequently experience problems such as mistakes, errors, setbacks, and barriers (Seckler et al., 2017; van Gelderen et al., 2005). We contribute a deeper understanding of the potentially positive consequences of problems that occur in the daily operations of entrepreneurs.

Third, we add to the general literature on error management. The error management perspective acknowledges that, even though errors are undesirable events, errors cannot be prevented completely (Frese & Keith, 2015). Once an error has occurred, the error management perspective suggests that individuals employ positive error handling strategies that involve coping with the errors, reducing negative error consequences, and optimizing positive error consequences such as learning, performance, and innovation (Frese & Keith, 2015). Research on error management has focused on learning from errors in the context of error management training (Bledow, Carette, Kühnel, & Pittig, 2016; Chillarege, Nordstrom, & Williams, 2003; Heimbeck et al., 2003; Keith & Frese, 2005, 2008), organizational error

management culture (van Dyck et al., 2005), and in different organizational units (Homsma, van Dyck, Gilder, Koopman, & Elfring, 2009; Hughes, Chang, & Mark, 2009). However, little scholarly attention has been paid to the issue of error management in entrepreneurship. We add to the literature by studying error mastery orientation in the entrepreneurial context, which is important from a theoretical standpoint because error management is especially relevant in contexts with high uncertainty, such as in entrepreneurship (Frese & Keith, 2015).

#### **4.2 Problems, errors, and failures**

We define a problem as the non-attainment of an entrepreneurial goal (Funken, 2016; Seckler et al., 2017). Problems occur frequently during the entrepreneurial process (Frese, 2009) and describe errors, setbacks, and critical events (Cope, 2003; Minniti & Bygrave, 2001; Politis, 2005; Seckler et al., 2017; Sitkin, 1992; van Gelderen et al., 2011). An error is a specific type of problem that refers to the non-attainment of a goal that could have been avoided (Frese & Zapf, 1994; Keith & Frese, 2005). This means that entrepreneurs a-priori “should have known better” (Hofmann & Frese, 2011, p. 275). However, in highly uncertain and risky environments, such as entrepreneurship, the non-attainment of a goal is not necessarily an error because risks reside in the environment and goal attainment is not completely in the hands of the entrepreneur (Frese & Keith, 2015). Thus, it is nearly impossible to distinguish between avoidable errors and unavoidable negative experiences in entrepreneurship. We therefore subsume avoidable and unavoidable negative experiences that describe the non-attainment of a goal under the more general concept of problems. Still, we refer to “error” mastery orientation because this is a well-established concept from the error management literature that is useful for understanding entrepreneurial learning from both avoidable and unavoidable negative experiences. We also distinguish between problems and failures. Failure describes the termination of a business or project (Shepherd, 2003; Singh et al., 2007; Ucbasaran et al., 2013; Zacharakis et al., 1999). Failure is a rather rare event and does not necessarily require the continuation of entrepreneurial activities.

#### **4.3 Antecedents of entrepreneurial learning from problems**

We base our theoretical reasoning on the EMC model (Seckler et al., 2017). The EMC model integrates the existing literature on entrepreneurial learning from problems into a comprehensive model. It draws on action regulation theory (Frese & Zapf, 1994; Zacher & Frese, 2018), control theories (Carver & Scheier, 1982, 1990), and emotion as feedback theory (Baumeister et al., 2007). According to the EMC model, error mastery orientation is an important factor that facilitates entrepreneurial learning from problems by influencing self-

regulatory skills related to emotional, motivational, and cognitive processes (Seckler et al., 2017). Entrepreneurial learning is defined as the accumulation of knowledge within the entrepreneurial process (Cope, 2005). Thus, entrepreneurial learning does not refer to a specific content that could be labeled “entrepreneurial” but rather to the context in which learning takes place (Cope, 2005). Error mastery orientation is defined as a proactive and positive way of dealing with problems (Frese & Keith, 2015; van Dyck et al., 2010). Error mastery orientation involves deliberately incurring the risk of problems in order to test ideas and to learn. Furthermore, error mastery orientation emphasizes the positive function of problems. This does not mean that problems are desired, but rather viewed as inevitable and as opportunities to improve one's skills and knowledge (Frese & Keith, 2015; Seckler et al., 2017; van Dyck et al., 2005).

We seek to test propositions by the EMC model and develop a deeper understanding of the factors facilitating entrepreneurial learning from problems. Specifically, the EMC model holds that error mastery orientation influences a set of self-regulatory skills related to emotional, motivational, and cognitive processes. Furthermore, the EMC model suggests that the set of self-regulatory skills mediates the effect of error mastery orientation on entrepreneurial learning from problems. The self-regulatory skills are especially important for learning from experience and in contexts where learners cannot rely on the guidance and monitoring of others (Harms, 2015), such as when entrepreneurs experience problems. Self-regulatory skills allow entrepreneurs to effectively regulate their emotion, motivation, and cognition when experiencing a problem. Based on the EMC model, we specifically focus on the positive effect of error mastery orientation on entrepreneurial learning from problems through the self-regulatory skills of emotion control, learning goal orientation, and metacognition. Each of these is now discussed in turn.

First, error mastery orientation increases emotion control. Emotion control is a self-regulatory skill that describes the ability to keep performance anxiety and negative emotions at a functional level when experiencing problems (Kanfer et al., 1996). Problems are negative experiences that evoke negative emotions. For example, a problem might seriously threaten the success of a business (e.g., a liquidity crisis) or a problem might involve interpersonal conflicts (e.g., quarrelling with an employee). Emotion control does not mean that entrepreneurs do not experience negative emotions when experiencing problems. However, it ensures that the intensity of negative emotions is less severe. Error mastery orientation facilitates emotion control because it emphasizes the positive function of problems. Entrepreneurs with a high error mastery orientation view problems as undesirable but also as

inevitable and as opportunities for learning (about, for example, effective leadership). The more entrepreneurs view problems not only as negative events but also as learning opportunities, the more they should be able to keep their negative emotions at a functional level. This is supported by empirical results showing that error mastery orientation had a positive effect on emotion control in the context of an error management training program (Keith & Frese, 2005). Furthermore, a positive perspective on failure has been shown to reduce negative emotions resulting from project failure (Shepherd et al., 2011).

Second, error mastery orientation increases learning goal orientation. Goal orientation is a self-regulatory skill that has a motivational effect (Dweck, 1986). In general, two types of goal orientations have been distinguished in learning contexts: learning goal orientation and performance goal orientation (Dweck, 1986). Individuals with a performance goal orientation seek to demonstrate good performance and to gain favorable judgements of competence (Frese & Keith, 2015; Heimbeck et al., 2003). They believe that ability is fixed (Dweck, 1986) and view problems as indicators of a lack of ability (Dweck & Leggett, 1988). In contrast, individuals with a learning goal orientation seek to increase their level of competence (Heimbeck et al., 2003) and to learn something new (van Dyck et al., 2010). They believe that ability is malleable (Dweck, 1986) and view problems as opportunities for learning (Dweck & Leggett, 1988). In the following we focus on learning goal orientation because learning goal orientation has been proposed to be related to error mastery orientation (van Dyck et al., 2010). We argue that error mastery orientation increases learning goal orientation when experiencing problems. Individuals who frame problems as a natural source of feedback in the learning process are more likely to adopt a learning goal orientation (Bell & Kozlowski, 2008). When experiencing a problem (e.g., losing customers), entrepreneurs with an error mastery orientation are more likely to think that they have control over the situation and are able to actively deal with the problem (e.g., by adapting a marketing strategy to win new customers). This corresponds to seeing ability as malleable, which should increase learning goal orientation. This line of reasoning is supported by empirical results. In a training context, instructions to adopt an error mastery orientation increased state-learning goal orientation for trainees low on trait-learning goal orientations (Bell & Kozlowski, 2008). Similarly, Keith and Frese (2005) have argued that individuals with a high error mastery orientation are more likely to adopt a learning goal orientation because they see errors as learning opportunities.

Third, error mastery orientation increases metacognition. Metacognition is a self-regulatory skill that describes the ability to plan, monitor, and revise one's thoughts and

behavior when experiencing problems (Bell & Kozlowski, 2008). Individuals with high metacognition evaluate their progress during task completion and adjust their behavior if necessary (Schraw, 1998). Error mastery orientation facilitates metacognition in a problem situation. When experiencing a problem, entrepreneurs with an error mastery orientation view problems as learning opportunities. This means that they are more likely to engage in metacognition and reflect more extensively and deeply about the problem (e.g., reduced demand), about causes of the problem (e.g., new competitors, changes in customer preferences, reductions in quality), and about problem consequences (e.g., liquidity, reputation) (Seckler et al., 2017). Thus, entrepreneurs with an error mastery orientation engage in a more effortful and deeper reflection about the problem by applying metacognitive skills when experiencing a problem. Empirical research supports this line of reasoning. Error mastery orientation had a positive effect on metacognition in the context of an error management training program (Keith & Frese, 2005).

***Hypothesis 1:** Error mastery orientation has positive effects on (a) emotion control, (b) learning goal orientation, and (c) metacognition.*

We hypothesize that the three self-regulatory skills (emotion control, learning goal orientation, and metacognition) have an effect on entrepreneurial learning from problems. First, emotion control has a positive effect on learning from problems. Emotion control is relevant because entrepreneurs experience negative emotions following a problem. Problems can evoke negative emotions such as anger, shame, or guilt (Frese & Keith, 2015). According to the EMC model, negative emotions can be functional and dysfunctional for learning from problems (Seckler et al., 2017). Negative emotions can be functional if they serve as a feedback signal that something went wrong and direct attention to the situation. This means that automatic processing is disrupted and individuals shift to a more conscious and effortful mode of processing, which facilitates learning. Negative emotions can be dysfunctional if they consume attentional resources that are necessary for learning (Kanfer et al., 1996; Shepherd, 2003; Shepherd & Patzelt, 2017). More specifically, individuals might be preoccupied with the negative emotions and direct their attention to the self and away from the problem (Kanfer et al., 1996; Keith & Frese, 2005). Whether negative emotions are functional or dysfunctional depends on the severity of negative emotions. The more severe the negative emotions, the less functional are the negative emotions for learning. Emotion control is an important mechanism that keeps negative emotions at a functional level (Seckler et al., 2017). Emotion control should therefore be positively related to learning. There is empirical

research to support this line of reasoning. Wolfe and Shepherd (2015) showed that a moderate level of negative emotions following problems was positively related to subsequent performance. Furthermore, empirical studies suggest that emotion control facilitates learning from problems (Byrne & Shepherd, 2015; Cope, 2011; Keith & Frese, 2005; Shepherd, 2004).

Second, learning goal orientation has a positive effect on learning from problems because it influences the framing of problems. Problems can be motivating and demotivating and the effects depend upon the framing of the problem (Seckler et al., 2017; Wood et al., 2000). If problems are framed as a lack of ability, problems may cause negative self-evaluative reactions and reductions in motivation (Bandura, 1997). Individuals may doubt their capacity to perform the task, which can set off a spiral of negative motivational effects, negatively affecting how the individuals interpret feedback and reducing interest in the task (Wood & Bandura, 1989). On the other hand, if problems are framed as negative feedback providing information for learning and improvement, problems may cause an increase in motivation (Wood et al., 2000). Problems serve as negative feedback signaling that the chosen goal has not yet been reached. This has motivational implications. According to control theory (Carver & Scheier, 1990), a discrepancy between current state and goal state has a motivational function, because people seek to reduce this discrepancy. Thus, people are more focused on the task and are more motivated to change their assumptions and behavior to reach the goal state, which results in learning. We argue that individuals with a learning goal orientation are more likely to frame problems as negative but informative feedback because they believe that ability can be improved. This will increase motivation to deal with the situation and result in increased learning.

Third, metacognition has a positive effect on learning from problems. Entrepreneurs with high metacognition will focus their attention on the problem and switch from automatic processing to more effortful deeper-level processing (Cope, 2003; Hofmann & Frese, 2011; Keith, 2011; Sitkin, 1992). Deeper-level processing leads to identifying and reflecting on the causes of the problem (Sitkin, 1992). Reflecting on the causes helps to learn in terms of identifying areas of misunderstanding or incorrect assumptions that can be corrected (Frese & Keith, 2015; Hofmann & Frese, 2011). Further, metacognition stimulates adaptive transfer, which means learning a new procedure or generating new solutions to a novel problem or situation (Keith & Frese, 2005). Adaptive transfer is especially useful for entrepreneurs because entrepreneurship is a highly dynamic process. Entrepreneurs frequently experience novel situations due to changes in the environment (e.g., new competitor, changing customer preferences, or new technologies). Adaptive transfer allows entrepreneurs to apply knowledge

to a broader range of new situations (Cope, 2005). Empirical research has shown that metacognition increased learning and adaptive transfer from errors in a training context (Keith & Frese, 2005).

***Hypothesis 2:** (a) Emotion control, (b) learning goal orientation, and (c) metacognition have positive effects on entrepreneurial learning from problems.*

We hypothesize that the three self-regulatory skills (emotion control, learning goal orientation, and metacognition) mediate the relationship between error mastery orientation and entrepreneurial learning from problems. Based on the EMC model we have argued that error mastery orientation influences three self-regulatory skills: emotion control, learning motivation, and metacognition (H1). Self-regulatory skills are important facilitators of entrepreneurial learning from problems because they influence entrepreneurs emotional, motivational, and cognitive processes when experiencing problems (Keith & Frese, 2005; Seckler et al., 2017). Consequently, we have argued that self-regulatory skills have a positive effect on entrepreneurial learning from failure (H2). Therefore, the effect of error mastery orientation on entrepreneurial learning from problems is indirect through self-regulatory skills.

***Hypothesis 3:** The set of self-regulatory skills (emotion control, learning goal orientation, and metacognition) mediates the effect of error mastery orientation on entrepreneurial learning from problems.*

## **4.4 Methods**

### **4.4.1 Sample**

Our sample consisted of small business owners in Uganda. To participate in the study they had to be the founder and owner of the business. Furthermore, the businesses had to be established for a period of at least 12 months before data collection. We followed two approaches to reach small business owners for participation in our study. First, a university-based network for the support of small businesses allowed us to contact their members and ask to join our study. We contacted 116 small business owners from the network by telephone. Fourteen small business owners did not meet the inclusion criteria. Out of the remaining 102 small business owners, 35 participated in the study (response rate: 34%). Ten participants did not complete the second measurement wave (dropout rate: 29%). Five participants were excluded from the analysis because of missing values in the first

measurement wave. Thus, 20 small business owners participated from the university-based network. Second, we chose random streets in the business district of Kampala, the capital city of Uganda. We asked small business owners, who were present and met the criteria, to participate in our study. This is a common approach in contexts where many small businesses are not registered or listed in directories (Frese et al., 2007; Gielnik, Krämer, Kappel, & Frese, 2014). Forty-three small business owners agreed to participate in the study. Seven participants did not complete the second measurement wave (dropout rate: 16%). Four participants were excluded because of missing values in the first measurement wave. Thus, 32 small business owners from the business district of Kampala participated in the study. In total, therefore, 52 small business owners participated in the study. These businesses employed between 0 and 160 employees (full time equivalents), with a mean of 14 employees and a median of 6 employees. The businesses were founded between 1986 and 2014 with a mean business age of 6 years and a median business age of 5 years. Small business owners were between 21 and 57 years old with a mean age of 34 years and a median age of 30 years. Of the small business owners who participated in this study, 34% were female.

#### **4.4.2 Procedure**

The data collection process consisted of two measurement waves, which were administered two weeks apart. Each measurement wave consisted of questionnaires and structured interviews. The structured interviews were administered by four research assistants, who were German graduate students. The research assistants were trained in how to conduct the interviews in a pre-test under the supervision of the first author. They were thoroughly trained about the interview method and coding scheme. The research assistants scheduled an appointment with each small business owner. Each interview was conducted by one research assistant. The answers were written down during the interview and subsequently transcribed by the interviewer. The coding of the open questions was based on the transcripts.

*First measurement wave.* At the beginning of each appointment, participants filled out a questionnaire that contained control variables and the measure of error mastery orientation. Participants then took part in a structured interview. Research assistants asked participants about a current problem, that they were facing (e.g., “Is there a problem that you have in your business and that you are right now working on to solve this problem?”). The research assistants used prompts to gain additional information, if necessary (e.g., “Please describe the problem in detail”; “When did the problem occur?”). The problem described in the interview was not part of the analysis. However, measures of emotion control, learning goal orientation,



metacognition, and entrepreneurial learning referred to this specific problem. At the end of the interview, participants were asked to take part in a cognitive ability test, which served as a control variable. After the interview, participants filled out a second questionnaire that contained measures on how they dealt with the problem discussed in the interview, specifically on emotion control, learning goal orientation, and metacognition.

*Second measurement wave.* Two weeks after the first measurement wave, participants were asked to participate in the second measurement wave, which consisted of two parts. First, participants took part in a structured interview. Research assistants asked participants to recall the problem they had talked about in the first interview. If participants did not recall the problem, research assistants repeated the problem based on their notes taken from the first interview. The research assistants explained that the subsequent questions in the interview and the questionnaire would all refer to this specific problem. Then, participants were asked to describe what they had learned from this problem (“What did you learn from this problem?”; “What did you change or want to change within your business because of this problem?”). Again, prompts were used to gain additional information, if necessary (e.g., “What do you want to do differently in the future because of this problem?”; “Anything else?”). The answers were transcribed and coded for the measure of entrepreneurial learning from problems. After completing the interview, participants filled out a questionnaire that contained measures on how they dealt with the problem discussed in the interview, specifically on emotion control, learning goal orientation, and metacognition.

#### **4.4.3 Measures**

*Error mastery orientation.* We measured error mastery orientation at the first measurement wave with 12 items from the Error Orientation Questionnaire (Rybowiak et al., 1999; van Dyck et al., 2010). The Error Orientation Questionnaire consists of eight differentiated subscales, which are distinguishable from each other (Rybowiak et al., 1999). Building on previous research on error mastery orientation (van Dyck et al., 2010), we used the subscales “Learning from errors” (e.g., “My mistakes have helped me to improve my work”), “Thinking about errors” (e.g., “After I have made a mistake, I think about how it came about”), and “Error risk taking” (e.g., “If one wants to achieve at work, one has to risk making mistakes”), which refer to a positive and active error handling approach. We combined the items to form our scale of error mastery orientation (Cronbach’s alpha = .77). Participants gave their answers on 5-point Likert scales ranging from “not at all” to “very much.”

*Emotion control.* We measured emotion control at the first and second measurement wave with the emotion control scale developed by Keith and Frese (2005). The scale consists of eight items. Participants were asked to rate their reaction to the specific problem that was discussed in the first interview. All items began with a general stem (“When the problem arose...”), followed by eight items (e.g., “... I calmly considered how I could continue my work.”). The participants answered all items on 7-point Likert scales ranging from “strongly disagree” to “strongly agree.” Cronbach’s alpha was  $\alpha=.76$  at the first measurement wave and  $\alpha=.61$  at the second measurement wave.

*Learning goal orientation.* We measured learning goal orientation at the first and second measurement wave with eight items. We adapted the goal orientation scale developed by VandeWalle (1997). The scale consists of three subscales: learning goal orientation, prove performance goal orientation, and avoid performance goal orientation. We used the subscales learning goal orientation and avoid performance goal orientation to form our measure of learning goal orientation. Avoid goal performance was reversed coded. All items were worded such that they referred to the specific problem that was discussed in the first interview (e.g., “This problem is a challenging and difficult task where I will learn new skills”). We excluded one item from our analyses because of its low total-item correlation across the two measurement waves (“I can learn a lot from this problem”). The item does not reflect whether someone views the problem as a learning opportunity, but rather how much he or she could learn from this problem. The item thus includes cognitive and contextual aspects, which might explain the low total-item correlation of this item. The participants answered all items on 7-point Likert scales ranging from “strongly disagree” to “strongly agree.” Cronbach’s alpha was  $\alpha=.71$  at the first measurement wave and  $\alpha=.76$  at the second measurement wave.

*Metacognition.* We measured metacognition at the first and second measurement waves with 14 items. We adapted items from Schippers, Den Hartog, and Koopman (2007) and from Schraw and Dennison (1994). In line with previous conceptualizations of metacognition, our measure captures the following regulatory skills: planning, monitoring, and evaluation (Jacobs & Paris, 1987; Schraw, 1998). All items were worded such that they referred to the specific problem that was discussed in the first interview (e.g., “I think of several ways to solve the problem and choose the best one”). The participants answered all items on 7-point Likert scales ranging from “strongly disagree” to “strongly agree.” Cronbach’s alpha was  $\alpha=.90$  at the first measurement wave and  $\alpha=.83$  at the second measurement wave.

*Entrepreneurial learning from problems.* We measured entrepreneurial learning from problems at the second measurement wave during the interview. Participants were asked to explain what they had learned from the problem that was discussed in the interview two weeks before (“What did you learn from this problem?”). The research assistants used prompts and kept on asking until the small business owner ceased to provide any additional information, in order to get a comprehensive account of participants' learning outcomes from this specific problem. The answers were written down by one research assistant, transcribed, and then rated by two research assistants based on a rating scheme. The two research assistants rated the transcripts independently of each other. The rating scheme was developed based on Cope's (2011) concept of learning from failure. In a qualitative study, Cope (2011) showed that small business owners learning from failure can be categorized according to four areas: learning about oneself, learning about the venture, learning about networks and relationships, and learning about venture management. The two research assistants rated the answers of each small business owner on these four learning task dimensions on 3-point Likert scales ranging from “low” to “high.” Inter-rater reliabilities between the two raters for learning about oneself (ICC = .89), learning about the venture (ICC = .87), learning about venture management (ICC = .89), and learning about networks and relationships (ICC = .79) were good. We computed the mean of the four ratings to attain the small business owner's score for learning ( $\alpha=.77$ ).

*Control variables.* We controlled for the severity of the problems mentioned by the participants. We assessed the severity of the problem with two items (“How threatening were the consequences of this problem for the success of your business?”; “How negative were the consequences of this problem for the success of your business?”). The participants answered the two items on 7-point Likert scales ranging from “not at all” to “absolutely.” Cronbach's alpha was  $\alpha=.84$ . Furthermore, we controlled for cognitive ability. Cognitive ability is a key antecedent of learning. Moreover, it might influence the detailedness, richness, and fluency of participants' answers in the interview. We used the Wechsler's digit span test forward and backward, a subtest to the HAWIE-R (Tewes, 1991). The test has been used in a similar setting (Gielnik, Frese et al., 2015; Glaub et al., 2014) as a proxy for working memory and general intelligence (Jensen, 1985). In addition, we measured entrepreneurial experience by asking the participants how many businesses they have started previously in addition to the current business. We further controlled for gender, age of business owner, and age of business.

#### 4.4.4 Method of analysis

We tested a multiple mediation model with two measurement waves. Testing mediation requires two equations: an equation for path *a* in which the independent variable significantly predicts the mediator variable, and an equation for path *b* in which the mediator variable significantly predicts the dependent variable (MacKinnon, 2008). We estimated path *a* in the regression of the T2 mediator (emotion control, learning goal orientation, and metacognition) on T1 error mastery orientation. We estimated path *b* in the regression of T2 entrepreneurial learning on T2 mediator (emotion control, learning goal orientation, and metacognition). The *ab* product term then provides an estimate of the mediation effect of error mastery orientation on entrepreneurial learning through the mediator (emotion control, learning goal orientation, and metacognition). We tested our hypotheses using structural equation modeling, which allowed us to test our hypotheses regarding mediation effects simultaneously. The model was fitted by maximum likelihood. We used the statistical software package R with the package “lavaan” (Rosseel, 2012) to run our analyses.

#### 4.5 Results

Table 4.1 presents the descriptive statistics and correlations of the study variables. Entrepreneurial learning from problems was positively correlated with cognitive ability ( $r=.45$ ,  $p<.01$ ), entrepreneurial experience ( $r=.40$ ,  $p<.01$ ), and learning goal orientation measured at T2 ( $r=.39$ ,  $p<.01$ ).

##### 4.5.1 Test of hypotheses

We tested our hypotheses using structural equation modeling, which allowed us to simultaneously test the hypothesized direct and indirect effects. We assessed the model fit with the root mean square error of approximation (RMSEA), the squared root mean residual (SRMR), and the comparative fit index (CFI). An RMSEA smaller than .06, an SRMR smaller than .08, and a CFI larger than .95 indicate good model fit (Hu & Bentler, 1999). In the model, we controlled for the self-regulatory skills (emotion control, learning goal orientation, and metacognition) at T1 in addition to the other control variables (cognitive ability, age, gender, severity of the problem, and number of prior businesses started). Controlling for self-regulatory skills at T1 allowed us to model change in the self-regulatory skills and to draw stronger inferences of causality (Ployhart et al., 2009; Uy et al., 2009). In addition, please note that we included cognitive ability as a control variable only for paths

Table 4.1 Descriptive statistics and correlations of study variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Gender <sup>a</sup> (T1)	0.65	0.48													
2. Age of business owner (T1)	34.21	9.57	-.15												
3. Cognitive ability (T1)	8.83	4.19	.01	.19											
4. Entrepreneurial experience (T1)	1.87	0.40	-.21	-.09	.24+										
5. Age of business (T1)	5.87	5.36	-.08	.64**	.06	.04									
6. Severity of problem	5.16	1.26	-.08	-.01	.06	-.15	.00								
7. Error mastery orientation (T1)	5.89	0.70	-.11	.04	.12	.16	-.04	.26+							
8. Emotion control (T1)	5.68	0.91	-.13	.22	-.04	.00	.20	-.24+	-.15						
9. Emotion control (T2)	5.62	0.72	-.03	.08	.03	-.07	.26+	-.12	.16	.54**					
10. Learning goal orientation (T1)	4.46	1.12	-.17	.04	.27+	.17	.13	-.18	-.16	.51**	.36*				
11. Learning goal orientation (T2)	4.40	1.11	-.18	.04	.31*	.11	.02	-.13	.10	.44**	.46**	.68**			
12. Metacognition (T1)	5.89	0.88	-.20	.04	.03	-.03	.14	.16	-.08	.42**	.11	.32*	.12		
13. Metacognition (T2)	6.09	0.55	-.12	-.05	-.07	-.03	.19	.24+	.26+	.10	.11	.07	.12	.21	
14. Entrepreneurial learning from problem (T2)	1.46	0.45	-.10	-.01	.45**	.40**	-.13	-.09	.14	.17	.23	.21	.39**	.03	.10

Note: 52 participants; <sup>c</sup> 0 = female, 1 = male; +  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ .

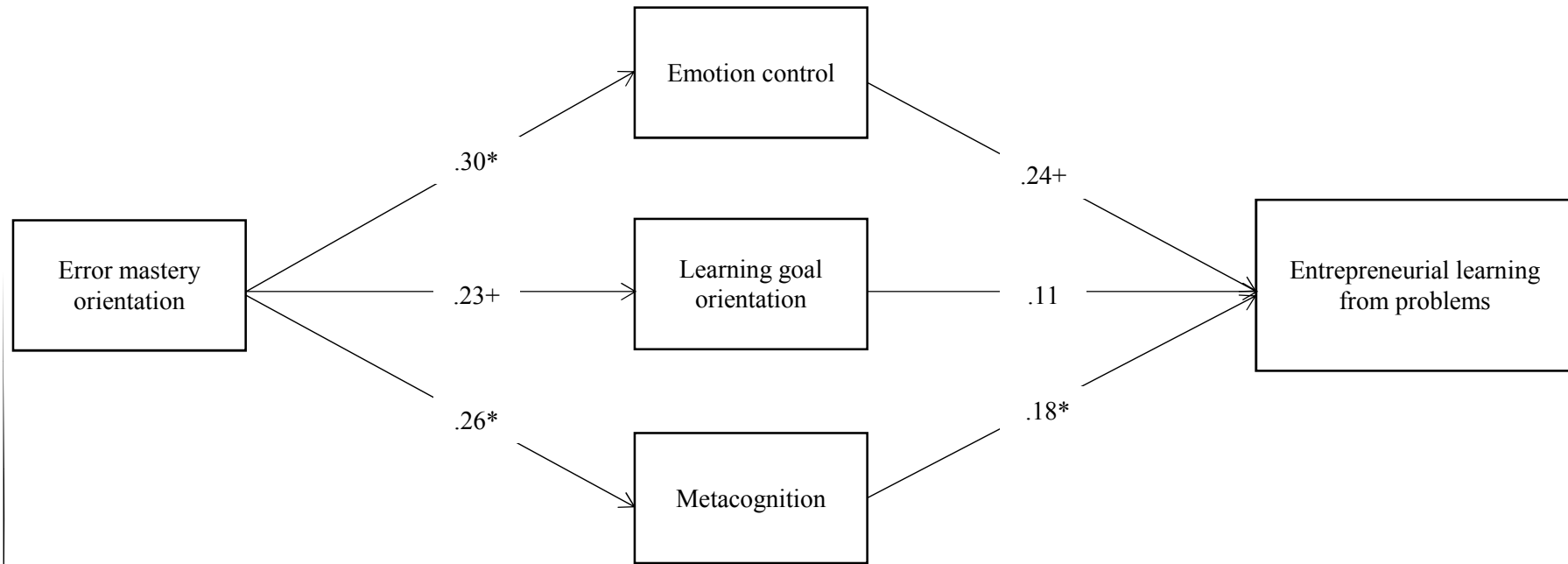


Figure 4.1 Structural equation model with standardized path coefficients.

Note. The model includes the following control variables: Gender, age of business owner, cognitive ability (only for paths leading to entrepreneurial learning from problems), entrepreneurial experience, age of business, severity of problem, emotion control (T1), learning goal orientation (T1), metacognition (T1); RMSEA = .04; SRMR = .04; CFI = .98; +  $p < .10$ ; \*  $p < .05$ ; \*\*  $p < .01$ .

leading to entrepreneurial learning from problems in order to control for detailedness, richness, and fluency of participants' answers in the interview.

The results are presented in Table 4.2. The results for the model showed a good fit ( $X^2(10)=17.56$ ,  $RMSEA=.04$ ;  $SRMR=.04$ ;  $CFI=.98$ ). We examined the path coefficients to test our hypotheses (see Figure 4.1). The first set of hypotheses predicts that error mastery orientation has a positive effect on the three self-regulatory skills. Hypothesis 1a, which states that error mastery orientation has a positive effect on emotion control, is supported by the data ( $\beta = .30$ ,  $p < .05$ ). Hypothesis 1b, which states that error mastery orientation has a positive effect on learning goal orientation, is supported by the data at a significance level of  $p=.10$  ( $\beta = .23$ ,  $p < .10$ ). Hypothesis 1c, which states that error mastery orientation has a positive effect on metacognition, is supported by the data ( $\beta = .26$ ,  $p < .05$ ). The second set of hypotheses predicts that the three self-regulatory skills have a positive effect on entrepreneurial learning from problems. Hypothesis 2a, which states that emotion control has a positive effect on entrepreneurial learning from problems, is supported by the data at a significance level of  $p=.10$  ( $\beta = .24$ ,  $p < .10$ ). Hypothesis 2b, which states that learning goal orientation has a positive effect on entrepreneurial learning from problems, is not supported by the data ( $\beta = .11$ , *ns*). Hypothesis 2c, which states that metacognition has a positive effect on entrepreneurial learning from problems, is supported by the data ( $\beta = .18$ ,  $p > .05$ ). Hypothesis 3 states that the three self-regulatory skills mediate the relationship between error mastery orientation and entrepreneurial learning from problems. To test this hypothesis, we calculated the indirect effect of error mastery orientation on entrepreneurial learning from problems through the three self-regulatory skills. The indirect effect was positive and significant (*indirect effect* = .14,  $p > .05$ ), supporting Hypothesis 3. To further examine the mediation effect, we compared the hypothesized model with an alternative model. In the alternative model we added a direct path to the hypothesized model from error mastery orientation and entrepreneurial learning from problems ( $\beta = -.05$ , *ns*). By comparing the two models, we can evaluate the strength of the mediation. The alternative model showed a good fit ( $X^2(15)=17.35$ ,  $RMSEA=.06$ ;  $SRMR=.04$ ;  $CFI=.97$ ). A Chi-square difference test comparing the two models was not significant ( $\Delta X^2(1)=.34$ , *ns*). This means that the alternative model does not provide a better fit. This finding indicates that the three self-regulatory skills fully mediate the relationship between error mastery orientation and entrepreneurial learning from problems.

#### 4.6 Discussion

The main goal of our study was to develop a better understanding of factors facilitating entrepreneurial learning from problems. More specifically, our aim was to build a more comprehensive model of entrepreneurial learning from problems that integrates existing research by taking emotional, motivational, and cognitive mechanisms into account. Based on the EMC model (Seckler et al., 2017), we argued that error mastery orientation is an important facilitator of entrepreneurial learning from problems. Further, we argued that error mastery orientation exerts a positive effect on entrepreneurial learning through a set of self-regulatory skills: emotion control, learning goal orientation, and metacognition. We tested our theoretical model in a longitudinal design with two measurement waves. We found that error mastery orientation had a positive effect on self-regulatory skills (emotion control, learning goal orientation, and metacognition). Further, emotion control and metacognition had a positive effect on entrepreneurial learning from problems. Learning goal orientation was not related to entrepreneurial learning from problems. Mediation analysis revealed that the set of self-regulatory skills mediated the relationship between error mastery orientation and entrepreneurial learning from problems. We believe that our findings complement the literature in meaningful ways and hold important implications for the entrepreneurship literature.

First, we add to the literature on entrepreneurial learning by testing an integrated conceptual model. Previous research has focused on single factors facilitating entrepreneurial learning from problems without integrating them into one model. Our study suggests that a set of self-regulatory skills, namely emotion control, learning goal orientation, and metacognition, transmits the positive effect of error mastery orientation on entrepreneurial learning from problems. The set of self-regulatory skills facilitates entrepreneurial learning from problems through influencing emotional, motivational, and cognitive processes, which can be related to existing research on entrepreneurial learning from failure.

*Emotion Control.* The entrepreneurship literature has stressed the importance of emotion control for learning in the context of business failures. In a qualitative study with small business owners, emotion control was found to reduce negative emotions after business failure, which in turn increased learning (Byrne & Shepherd, 2015). Fang He et al. (2017) have demonstrated in a study with entrepreneurs from the information technology (IT) industry that emotion control influenced the learning for entrepreneurs that experienced a high failure velocity (number of failed businesses divided by number of years as an IT



entrepreneur). Similarly, research has stressed the importance of emotion control for learning from business failure (Shepherd, 2003; Shepherd, Williams, Wolfe, & Patzelt, 2016) and from project failure (Shepherd et al., 2013). Our results support previous research on the importance of emotion control.

*Learning goal orientation.* Entrepreneurship research has acknowledged that problems can both motivate and demotivate. The motivating effect was examined in a study showing that business owner who had experienced business failure pursued more entrepreneurial opportunities than business owner who had not experienced business failure (Ucbasaran et al., 2006). However, problems might reduce an entrepreneur's belief in his or her ability to carry out successful entrepreneurial actions (Bandura, 1997), thus reducing motivation (Frese & Keith, 2015). Studies have shown that entrepreneurs might experience reduced motivation following business failure, because the loss of a business thwarts an individual's psychological needs (Shepherd & Cardon, 2009; Shepherd et al., 2016). However, while Shepherd et al. (2016) merely acknowledge, that entrepreneurs might vary considerably in their motivation following failure, our study suggests that learning goal orientation is an important self-regulatory skill that is related to motivation and learning (VandeWalle, 1997). Thus, learning goal orientation might explain why some entrepreneurs are more motivated and others are less motivated to learn after experiencing problems.

*Metacognition.* Entrepreneurship research has stressed the importance of cognitive processing for entrepreneurial learning from problems. Cope (2011) argues that a critical reflection is necessary in order to understand why the failure occurred and to learn from it. Furthermore, learning events such as problems and failures can stimulate deeper-level processing, which results in fundamental changes of knowledge rather than gradual accumulation of more routinized knowledge (Cope, 2003). At the same time, research suggests that many entrepreneurs do not learn from problems and failures (Cannon & Edmondson, 2005; van Gelderen et al., 2005). One reason is that entrepreneurs do not discuss and analyze problems and failures thoroughly (Cannon & Edmondson, 2005). This is in line with our findings, which suggest that metacognition, which instigates reflection processes, is positively related to entrepreneurial learning from problems. Similarly, Byrne and Shepherd (2015) have identified metacognitive strategies as important antecedents of learning from business failure in a multiple case study.

Second, we add to the entrepreneurship literature by introducing the concept of error mastery orientation. We introduce error mastery orientation as an important facilitator of entrepreneurial learning from problems. Previous research has argued that adopting a positive

attitude towards problems is a prerequisite for effective coping with problems (Politis & Gabrielsson, 2009). Similarly, Cannon and Edmondson (2005) recommend that organizations should view errors as inevitable in a complex and changing world and thus the best thing organizations can do is to learn from errors. Rather than straightforwardly avoiding failure, effectuation stresses the importance of effectively managing failures for successfully creating a venture (Sarasvathy, 2001). Even though these studies do not explicitly refer to error mastery orientation, the descriptions reflect upon the same theoretical construct. We add to the entrepreneurship literature by offering a more explicit definition and theoretical discussion. Error mastery orientation is already established in the organizational (Bledow et al., 2016; Homsma et al., 2009; van Dyck et al., 2005), and psychological literature (Chillarege et al., 2003; Heimbeck et al., 2003; Keith & Frese, 2005, 2008) as an important construct related to learning. Similarly, our results indicate that error mastery orientation is positively related to learning in the entrepreneurship context. We believe that introducing error mastery orientation into the entrepreneurship literature deepens our understanding of entrepreneurial learning from problems and failures.

Third, we add to the error management literature. The error management literature assumes that it is impossible to prevent all errors and that individuals should thus adopt a positive error handling approach to maximize positive outcomes such as learning and innovation (Frese & Keith, 2015). This is especially relevant in uncertain environments such as entrepreneurship (Frese & Keith, 2015). Despite the well-established link between error mastery orientation and learning (Keith & Frese, 2008), little research has investigated the mechanisms that transmit the positive effect of error mastery orientation on learning. One exception is the study by Keith and Frese (2005) in the context of an error management training program. Our results replicate the findings of Keith and Frese (2005), who have identified emotion control and metacognition as two mechanisms that transmit the positive effect of error mastery orientation on learning. We extend the findings of Keith and Frese (2005) by showing that error mastery orientation has a positive effect on learning goal orientation over and above the main effects of emotion control and metacognition. This is in contrast to findings by van Dyck et al. (2010), who found the same relationship but in the opposite direction such that learning goal orientation predicted error mastery orientation. It is possible that our results and the results of van Dyck et al. (2010) are not contradictory but point to a reciprocal relationship between error mastery orientation and learning goal orientation. Future studies could examine this relationship more closely in a longitudinal design.

#### **4.6.1 Strengths and limitations**

There are a number of limitations associated with the study, some of which offer avenues for future research. A limitation concern arises from the comparably small sample size (52 small business owners), which may cause unstable results (Jenkins et al., 2014). Our study builds upon previous research that indicates that our results examine stable effects that have been found in other studies as well. Furthermore, we obtained 104 observations from the 52 business owners because of the longitudinal design, which improves the robustness of our findings. However, future research should replicate our findings in a larger sample. Furthermore, our study was conducted in Uganda, a country with one of the highest levels of entrepreneurial activity (Namatovu, Balunywa, Kyejjusa, & Dawa, 2011) and one of the lowest gross national incomes (The World Bank, 2010). In general, around 30% of new ventures fail within the first 4 years (Headd, 2003). The higher level of entrepreneurial activity in Uganda might also result in a higher number of problems and failures. Thus, problems and failures might be more frequent in Uganda than in more developed countries, which might influence our results. However, we believe that a good case can be made for the generalizability of our results. Our theoretical model is based on research from the error management literature. This research has investigated error mastery orientation and mediating mechanisms on learning in error prone contexts such as in an error management training (Keith & Frese, 2005). Further, much of the error management research has been conducted in developed countries (e.g., Bledow et al., 2016; Chillarege et al., 2003; Homsma et al., 2009). Thus, we believe that our findings are generalizable to more developed countries.

A strength of our study is the use of structured interviews to measure entrepreneurial learning. As Frese et al. (2007) point out there are a number of advantages in the combination of qualitative interviews and quantitative coding. Structured interviews have shown excellent external validity in meta-analytic research (Schmidt & Hunter, 1998). Furthermore, they help to overcome problems such as “unclear representation of constructs to participants, erratic answers to questionnaire items, and problems of interpreting what the answers really mean” (Frese et al., 2007, p. 1495).

Even though structured interviews are able to overcome some of the problems that are usually part of questionnaires, they still rely on self-reports of the entrepreneur. It is important to note that the self-reports of entrepreneurial learning might not be rational and unbiased. Recently, entrepreneurship scholars have applied a sensemaking perspective to entrepreneurial learning from problems and failure (Cardon et al., 2011; Shepherd, 2009;

Ucbasaran et al., 2013). Sensemaking is an interpretative process that describes how people assign meaning to events (Gioia & Chittipeddi, 1991; Weick, 1995). It is a subjective process that has an emphasis on plausibility rather than accuracy (Ucbasaran et al., 2013). Thus, learning based on sensemaking dynamics might not necessarily yield to adequate knowledge but it is possible that wrong assumptions are replaced by different wrong assumptions. We reduced the risk of merely measuring sensemaking, which might be biased, by conducting structured interviews and having the entrepreneurs' answers rated by two independent raters. However, future research could investigate whether the knowledge resulting from the learning process does have a positive impact on objective measures of business success such as profit. This would indicate that the knowledge is indeed based on rational and unbiased assumptions that prove helpful for business success.

#### **4.6.2 Conclusion**

This study makes an important contribution to the debate on how entrepreneurs learn from problems. Our results suggest that error mastery orientation is an important antecedent that transmits its positive effect on entrepreneurial learning from problems through influencing a set of self-regulatory skills. The findings underline the value of self-regulatory skills for overcoming the emotional, motivational, and cognitive barriers that are associated with experiencing problems in order to learn.

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## **5. General discussion**

In this dissertation, I have sought to develop a better understanding of entrepreneurial learning from problems and failures. More specifically, I have focused on how and when entrepreneurs learn from problems and failures. To answer this purpose, this dissertation has built on psychological theories and developed a comprehensive theoretical model comprised of individual factors facilitating entrepreneurial learning from problems and failures. The Emotion-Motivation-Cognition (EMC) model describes how problems and failures instigate processes involving emotion, motivation, and cognition that results in entrepreneurial learning. Furthermore, the model suggests that error mastery orientation is a moderator influencing the emotional, motivational, and cognitive processes. Propositions of the EMC model were tested and confirmed in two empirical studies. The findings suggest that error mastery orientation moderates the relationship between problems and entrepreneurial learning. Furthermore, the findings suggest that error mastery orientation exerts its positive effect on entrepreneurial learning from problems through enhancing self-regulatory skills that are related to emotional, motivational, and cognitive processes. Finally, the findings suggest that entrepreneurial learning from problems has a positive effect on business success.

### **5.1 General theoretical implications**

The findings of this dissertation hold important theoretical implications. First, I add to the literature by taking a process perspective on individual success factors in entrepreneurship. Entrepreneurship involves the discovery, evaluation, and exploitation of entrepreneurial opportunities (Shane & Venkataraman, 2000). This definition implies that entrepreneurship is a continuous, evolving process, rather than a single event (Baron, 2007). To fully understand the nature of entrepreneurship it is important to research change and examine how individual factors unfold and develop over time (Baron, 2007). While entrepreneurship is increasingly theorized as a process (Baron, 2007), empirical studies researching changes in the entrepreneurial process over time are still lagging behind (McMullen & Dimov, 2013). Empirical studies continue to research individual factors as static entrepreneurial phenomena at particular points in time (Baron, 2007; McMullen & Dimov, 2013). This dissertation responds to the calls for more theoretical and empirical research on entrepreneurship as a process and examines changes in individual factors. Chapter 2 theoretically develops the EMC model and theorizes about how problems and failures instigate emotional, motivational, and cognitive factors that facilitate entrepreneurial learning. The EMC model explicitly takes into account the dynamic effects of emotion, motivation, and

cognition over time and proposes short- and long-term effects. Chapter 3 empirically examines the effects of problems that happen within the entrepreneurial process in a longitudinal study design. Previous research on learning from negative experiences has mainly focused on studying business failure as a single event (Byrne & Shepherd, 2015; Cope, 2011; Shepherd, 2003; Stokes & Blackburn, 2002) while neglecting more frequent negative experiences that happen within the entrepreneurial process. Furthermore, Chapter 3 demonstrates how the interplay of problems and error mastery orientation stimulates change in entrepreneurial learning. Chapter 4 empirically examines how error mastery orientation facilitates entrepreneurial learning from problems by stimulating change in self-regulatory skills. In sum, this dissertation concludes that accounting for changes in individual factors allows for a more accurate and differentiated picture of the processes that underlie successful entrepreneurship.

Second, I add to the literature by developing and testing an integrated theoretical model of entrepreneurial learning from problems and failures. There is an ongoing need for improving theory building by integrating research into coherent theoretical models. Integrating research is important for identifying primary factors, for detecting interrelationships between factors, and for clarifying contradictory findings (Minniti et al., 2007). Entrepreneurship research has long been criticized for being varied, scattered, and fragmented, and for generally lacking coherence (Aldrich & Baker, 1997). In a thorough literature review, Wang and Chugh (2014) conclude that research on entrepreneurial learning is highly individualistic and fragmented in nature. While there has been substantial advancement in building coherent theoretical models in entrepreneurship, there is still room for improvement, especially in relatively new research areas such as entrepreneurial learning. I complement the literature on entrepreneurial learning by developing an integrated theoretical model. Chapter 2 builds upon action regulation theory (Frese & Zapf, 1994; Zacher & Frese, 2018), control theories (Carver & Scheier, 1982, 1990), and emotion as feedback theory (Baumeister et al., 2007) as well as on previous empirical studies, in order to develop the EMC model of entrepreneurial learning. The EMC model integrates previous research by theorizing about emotional, motivational, and cognitive processes relevant for entrepreneurial learning from negative experiences. Chapters 3 and 4 empirically test the propositions of the EMC model. Chapter 3 suggests that error mastery orientation moderates the relationship between problems and entrepreneurial learning. Furthermore, entrepreneurial learning predicts changes in business success. Chapter 4 suggests that a set of self-regulatory skills that

are related to emotional, motivational, and cognitive processes facilitate entrepreneurial learning from problems.

## **5.2 General practical implications**

The findings of this dissertation hold important practical implications for entrepreneurship education. In the popular literature, there is a trend to glorify business failures as an instant route to success (e.g., Babineaux & Krumboltz, 2013; Maxwell, 2007). Popular business mantras such as “fail fast, fail often” suggest that failure should be embraced (Isenberg, 2011). Embracing failure is also the underlying approach of increasingly popular events such as FailCon (FailCon, 2017) or Fuckup Nights (Fuckup Nights, 2017), where entrepreneurs share stories on problems and failures to learn from each other. This dissertation suggests being cautious to praise problems and failures as an automatic way to entrepreneurial learning and business success. The results suggest that problems and failures might also have detrimental effects on emotion, motivation, and cognition, potentially hindering entrepreneurial learning. Whether or not entrepreneurs learn from problems and failures depends on the entrepreneurs’ error mastery orientation. Thus, this dissertation suggests that entrepreneurs should adopt an error mastery orientation, which describes a positive error handling strategy. It is important to note that adopting a positive error handling approach does not suggest error prevention is unimportant (van Dyck et al., 2005). The primary goal should be to prevent errors from happening. However, the error management perspective acknowledges that errors cannot be prevented completely. Thus, once an error happens, entrepreneurs should adopt an error mastery orientation to decrease negative and increase positive outcomes such as learning.

Given that problems and failures happen frequently and provide useful learning opportunities for entrepreneurs, entrepreneurship education should teach students on how to successfully deal with problems and failures and more specifically on how to adopt an error mastery orientation. Entrepreneurship education aims to improve participants entrepreneurial knowledge through, for example, lectures and direct experience (e.g., action-based training, simulations) (Shepherd, 2004). Error mastery orientation can be incorporated into these entrepreneurship education approaches (Shepherd, 2004). Shepherd (2004) provides a pedagogical framework for teaching students about emotion and learning from failure. I build upon and complement Shepherd's (2004) work by incorporating the findings of this dissertation into his pedagogical framework.

*Lectures.* The content of lectures is highly reliant on available theory (Shepherd, 2004). In the following I propose the layout of a possible lecture including theories that may be used to teach students how to deal with problems and failures. First, students learn about the emotional attachment of entrepreneurs to their businesses. Literature on passion may provide the theoretical foundation (e.g., Cardon, Foo, Shepherd, & Wiklund; Cardon et al., 2012; Cardon, Zietsma, Saporito, Matherne, & Davis, 2005; Gielnik, Spitzmuller, Schmitt, Klemann, & Frese, 2015; Murnieks, Mosakowski, & Cardon, 2014). Explaining the strong emotional connection of entrepreneurs to their business helps students better understand why problems and failures might result in strong negative emotions. Second, students learn about how problems and failures may have beneficial and detrimental effects on emotion, motivation, cognition, and learning. The EMC model of entrepreneurial learning developed in Chapter 2 may provide the theoretical foundation. Third, students learn about error mastery orientation. The error management literature provides a solid theoretical basis to teach students the key elements of error mastery orientation (e.g., Frese & Keith, 2015; Keith & Frese, 2008; van Dyck et al., 2010). As Shepherd (2004) notes it is difficult to teach students about dealing with emotions and negative experiences solely in a lecture. Thus, he advocates complementing lectures with direct learning experiences.

*Direct experience.* A highly effective method for teaching students about entrepreneurship is action-based entrepreneurship training (Gielnik, Frese et al., 2015). Action-based entrepreneurship training allows students direct experience by engaging them in real start-up activities. Students are exposed to experiencing problems and failures as part of the training. This dissertation suggests that students should not only be exposed to negative experiences but also taught how to deal with them effectively. One way of achieving this is to incorporate elements of error management training to increase error mastery orientation (Keith & Frese, 2005). Chapters 2 and 3 offer suggestions on how elements of error management training can be incorporated into action-based entrepreneurship trainings.

For various reasons (e.g., time constraints, university regulations) it might not always be possible that students engage in real start-up activities. Simulation-based education provides an alternative. Simulations such as the “Small Business Growth Management Flight Simulator” require students to make business decisions and track performance, in a safe environment (Shepherd, 2004). Problems can be induced by high workload, distractions, or ambiguous information (Ziv, Small, & Wolpe, 2000). The simulation should be complemented by oral debriefings (Shepherd, 2004) through which students learn the principles of error mastery orientation by discussing problems in small groups under the



guidance of an instructor. Problems should be discussed openly without concern of blame or guilt (Ziv et al., 2000) and viewed as learning opportunities. In groups, students should discuss how the problems helped them to better understand the underlying principles of the simulation.

### **5.3 General conclusion**

In conclusion, this dissertation deepens our understanding of *how* and *when* entrepreneurs learn from problems and failures. By taking a process perspective, the theoretical model developed in this dissertation unravels the emotional, motivational, and cognitive processes involved in entrepreneurial learning from problems and failures. Furthermore, this dissertation demonstrates that entrepreneurial learning from problems and failures is not automatic. Rather, error mastery orientation that describes a positive error handling approach influences whether or not entrepreneurs learn from problems and failures. The general finding that error mastery orientation plays an important role holds true across different contexts and provides a fruitful basis for deriving practical implications for lecturers and trainers.

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