Making a Difference: Investigating the Effects of Entrepreneurship Training and Entrepreneurial Passion on Venture Innovation

ABSTRACT

Innovation is a key driver of new venture success. However, our theoretical understanding of how to promote innovation among new ventures is limited. In this study, we develop and empirically test a comprehensive theoretical model on the roles of entrepreneurship training and entrepreneurial passion for venture innovation. Specifically, we hypothesize that entrepreneurship training promotes participants’ tendency to establish innovative rather than imitative ventures. We also propose that entrepreneurial passion is an important mechanism explaining why entrepreneurship training leads to venture innovation. In particular, we argue that entrepreneurship training increases participants’ positive feelings of entrepreneurial passion which in turn predict venture innovation. We further propose that entrepreneurial identity centrality strengthens the effect of positive feelings of entrepreneurial passion on venture innovation. To test our theoretical model, we conducted a longitudinal randomized controlled field experiment with three measurement waves over a period of 12 months. Analyses of data from 131 participants revealed a marginally significant positive effect of entrepreneurship training on venture innovation. This effect was not mediated by positive feelings of entrepreneurial passion. However, our findings showed a marginally significant interaction effect between positive feelings of entrepreneurial passion and entrepreneurial identity centrality on venture innovation. Our study contributes to our understanding of antecedents of venture innovation and represents an important step toward a more integrated theory on entrepreneurship training and venture innovation.

Keywords: Entrepreneurship, entrepreneurship training, passion, innovation

Note for the reviewers: We are currently in the process of collecting additional data on venture innovation. As of now, we only find and report marginally significant effects on venture innovation. We hope that the additional data will substantiate and strengthen these effects. As such, although we currently only report marginally significant results, I would appreciate receiving feedback on the potential theoretical contribution of the study.
INTRODUCTION

Innovation is a key driver of new venture success (Baron & Tang, 2011; Heunks, 1998). The introduction of novel and useful products, services, or processes provides new ventures with a competitive advantage (Porter, 1980) and allows them to compete with more established and resource-rich firms in the competitive market place (Rosenbusch, Brinckmann, & Bausch, 2011). As such, innovation has often been described as an important factor driving a new venture’s profits, growth, and long-term survival (Baron & Tang, 2011; Gielnik, Frese, Graf, & Kampschulte, 2012; Heunks, 1998; Schumpeter, 1934). Indeed, there is meta-analytic evidence showing a positive effect of innovation on the success of new ventures (Rosenbusch et al., 2011). Moreover, innovation significantly contributes to economic growth and wealth creation (Kirchoff, 1991; Mueller, 2007).

Whereas the central role of innovation is widely acknowledged in theory, its implementation in practice is limited. This is especially true for countries characterized by a collectivistic culture such as countries in Africa, where entrepreneurs primarily focus on copying existing business models rather than introducing something new (Gielnik et al., 2012; Glaub, Frese, Fischer, & Hoppe, 2014; Herrington, Kew, & Kew, 2010; Kiggundu, 2002; Rosenbusch et al., 2011). Indeed, Kiggundu (2002) has noted that collectivistic and developing countries in Africa mainly do not suffer from a low number of ventures but rather from a low number of innovative ventures. As such, an important task of research is to provide an understanding of how to promote innovation among new ventures (Klaukien, Shepherd, & Patzelt, 2013). However, past research leaves our theoretical understanding of main predictors and pathways leading to venture innovation incomplete (Baron & Tang, 2011). We thus aim to advance our theoretical understanding of antecedents of venture innovation by proposing and testing a theoretical model on the roles of entrepreneurship training and entrepreneurial passion for venture innovation. Our theoretical model posits that entrepreneurship training is an important factor that systematically fosters venture innovation.
Moreover, we propose that entrepreneurial passion is a key mechanism explaining the effect of entrepreneurship training on venture innovation. Specifically, we argue that positive feelings of entrepreneurial passion mediate the effect of entrepreneurship training on venture innovation. We further propose that entrepreneurial identity centrality reinforces the effect of positive feelings of entrepreneurial passion on venture innovation (see Figure 1). We test our theoretical model using a randomized controlled field experiment in Tanzania. We employed a longitudinal pretest-posttest design with three measurement waves over a period of 12 months. The design of our study represents the “gold standard” in evaluation research and thus provides rigorous evidence on causal effects leading to venture innovation (Reay, Berta, & Kohn, 2009).

We aim at contributing to research on entrepreneurship and innovation in three ways. First, we seek to promote our theoretical understanding of antecedents of venture innovation by investigating the predictive roles of entrepreneurship training and entrepreneurial passion for venture innovation. Past research suggests that entrepreneurs exert a strong impact on firm-level outcomes such as venture innovation (e.g., Baum, Locke, & Smith, 2001; Baum & Locke, 2004; Frese et al., 2007; Rauch & Frese, 2007). However, our understanding of how and why entrepreneurs foster their venture’s innovativeness is limited (Baron & Tang, 2011). Using a randomized controlled field experiment, we provide evidence that entrepreneurship trainings systematically increase participants’ tendency to start innovative rather than imitative ventures. Moreover, our findings reveal that entrepreneurial passion plays a key role in predicting venture innovation. As such, our study represents an important step toward a better understanding of key drivers of venture innovation (Baron & Tang, 2011).

Second, we strive to add to research on entrepreneurship education by examining the effects and underlying mechanisms of entrepreneurship trainings. Over the last decades, the
number of entrepreneurship trainings has increased rapidly in both developed and developing countries around the world (Cho & Honorati, 2014; Kuratko, 2005; Martin, McNally, & Kay, 2013; Rasmussen & Sørheim, 2006; Vesper & Gartner, 1997). A recent meta-analysis (Martin et al., 2013) provided evidence that entrepreneurship trainings promote participants’ entrepreneurial knowledge and skills, attitudes, intentions, start-up activity, and performance. As such, there is robust evidence that entrepreneurship trainings foster participants’ tendency to start and succeed with a new venture. However, there is no evidence whether entrepreneurship trainings also promote participants’ tendency to grow more innovative ventures. Understanding the effect of entrepreneurship training on venture innovation is important, given that many countries mainly do not suffer from a low number of ventures but rather from a low number of innovative ventures (Kiggundu, 2002). As such, our study contributes to entrepreneurship education research by examining the effect of entrepreneurship training on the innovativeness of participants’ ventures one year after the training. Given that venture innovation is an important predictor of new venture success (Rosenbusch et al., 2011) and economic growth (Mueller, 2007), the empirical evidence for the impact of entrepreneurship training on venture innovation substantiates the significance of entrepreneurship trainings for alleviating poverty and promoting economic development in developing countries (c.f. Gielnik, Krämer, Kappel, & Frese, 2014; Mueller, 2007). In addition, our study adds to our theoretical understanding of the impact of entrepreneurship training on venture innovation by investigating the role of entrepreneurial passion in this relationship. We employed a longitudinal study design assessing both short-term motivational outcomes (i.e., entrepreneurial passion) directly after the training and long-term venture-level outcomes (i.e., venture innovation) one year after the training. Investigating both short-term motivational outcomes and long-term venture-level outcomes is important to fully understand the differential effects and mechanisms underlying entrepreneurship trainings (Gielnik, Frese, et al., 2015; Martin et al., 2013; Pittaway & Cope, 2007). Against this background, scholars
have repeatedly called for theoretically grounded and empirically sound studies integrating short-term and long-term outcomes (Martin et al., 2013; Naia, Baptista, Januário, & Trigo, 2014) with a specific focus on emotional outcomes (Lepoutre, Van den Berghe, Tilleuil, & Crijns, 2010; Zampetakis, Lerakis, Kafetsios, & Moustakis, 2015). We answer these calls and conducted a randomized controlled field experiment using a pretest-posttest control group design with three measurement waves assessing both short-term effects on entrepreneurial passion and long-term effects on venture innovation over a period of 12 months. As such, our study overcomes methodological shortcomings of past entrepreneurship education research and contributes to our theoretical understanding of causal effects following entrepreneurship trainings (Martin et al., 2013; Pittaway & Cope, 2007).

Third, our study contributes to research on entrepreneurial passion. Entrepreneurial passion has often been considered as one of the most important predictors of entrepreneurs’ success (e.g., Bird, 1988; Cardon, Wincent, Singh, & Drnovsek, 2009; Cardon, Zietsma, Saparito, Matherne, & Davis, 2005; Drnovsek, Cardon, & Patel, 2016; Smilor, 1997). In their theory of entrepreneurial passion, Cardon and colleagues (2009) describe entrepreneurial passion as a strong motivational force predicting an entrepreneur’s cognitions, behaviors, and success. Past research has provided some empirical evidence for Cardon and colleagues’ (2009) theory of passion by showing a positive effect of an entrepreneur’s passion on his or her behavior (e.g., Cardon & Kirk, 2015; Murnieks, Mosakowski, & Cardon, 2014). However, empirical evidence for the predictive validity of an entrepreneur’s passion for firm-level outcomes is scarce (P. Chen, Ellsworth, & Schwarz, 2015; Drnovsek et al., 2016). We thus answer calls for research on firm-level outcomes of passion and investigate the effect of entrepreneurial passion on venture innovation (P. Chen et al., 2015). Moreover, we go beyond past research that mainly focused on the affective component of passion and offer a more fine-grained examination of the interactive effects of the two components underlying passion, i.e., positive feelings of entrepreneurial passion and entrepreneurial identity centrality.
ENTREPRENEURSHIP TRAINING AND VENTURE INNOVATION

In this study, we investigate the effect of entrepreneurship training on venture innovation. Venture innovation refers to the introduction of novel and potentially useful products, services, or processes within a new venture (Amabile, 1996; Anderson, Potocnik, & Zhou, 2014; West & Farr, 1990). As such, venture innovation comprises two types of innovation, i.e., product or service innovation and process innovation (Brahma & Panda, 2014; Damanpour, 2010; Knight, 1967). Product or service innovation represents the introduction of new and useful products or services to market, whereas process innovation refers to new and useful ways of producing or rendering, delivering, and marketing the product or service (Barras, 1986; Damanpour & Gopalakrishnan, 2001; Damanpour, 2010; Knight, 1967).

The entrepreneurship training was a 12-week action-oriented entrepreneurship training (Gielnik, Frese, et al., 2015). We designed the entrepreneurship training based on action regulation theory (Frese & Zapf, 1994). According to action regulation theory, trainings should emphasize two main principles, i.e., learning through action principles and learning through action (Frese & Zapf, 1994). Learning through action principles means that participants learn concrete action principles rather than abstract theoretical knowledge (Bischoff, Gielnik, & Frese, 2014; Frese, Beimel, & Schoenborn, 2003). Action principles are rules of thumb or heuristics that are derived from theoretical and empirical evidence and that provide specific knowledge about what to do and how to do something in order to accomplish a certain goal (Frese et al., 2003; Frese & Zapf, 1994; Gielnik, Frese, et al., 2015).

Accordingly, our training included evidence-based action principles about how to become a successful entrepreneur (Gielnik, Frese, et al., 2015). Learning through action means that participants actively perform the target behavior (Frese & Zapf, 1994). We incorporated learning through action by asking participants to start and operate micro-businesses in the course of the training. In the first session of the training, we asked participants to build
entrepreneurial teams of four to seven persons, to identify a business opportunity, and to launch a business. The businesses were set up to make profit within the 12-week training period. The participants should go through the entire entrepreneurial process from identifying a business opportunity to managing a business under real business conditions. For this purpose, they obtained starting capital of approximately 100 USD which was to be redeemed at the end of the training. In the course of the training, participants performed all major activities that are required in the entrepreneurial process. For example, they assembled required resources, developed marketing strategies, negotiated with potential customers and suppliers, and brought their product or service to market. The participants started different types of businesses such as selling electronic equipment, offering shoe shining service, providing weighing and dietary counseling, and selling quail eggs.

The Effect of Entrepreneurship Training on Venture Innovation

We hypothesize that entrepreneurship training has a positive effect on venture innovation (see Figure 1). We build this hypothesis on action regulation theory (Frese & Zapf, 1994). Action regulation theory emphasizes that innovation requires action (Frese, 2009; see also Amabile, 1997). To develop and implement a novel and useful product, service, or processes, entrepreneurs need to actively search for opportunities to differentiate themselves from their competitors and to be self-starting in exploiting them (Glaub et al., 2014). To exploit the opportunity, entrepreneurs further need to actively approach potential investors and to persist in the face of obstacles that are likely to arise when trying to introduce novel products, services, or processes (Frese, Fay, Hilburger, Leng, & Tag, 1997; Solomon, Frese, & Friedrich, 2013). As such, introducing new products, services, or processes requires entrepreneurs to be active and self-starting rather than passive and reactive (Frese, 2009).

We argue that people’s tendency to be active and self-starting is fostered by an action-oriented entrepreneurship training. Action-oriented entrepreneurship trainings are characterized by their focus on action (Frese et al., 2003; Rasmussen & Sørheim, 2006).
More specifically, the present action-oriented entrepreneurship training was built on two training principles derived from action regulation theory, i.e., learning through action principles and learning through action, which both foster participants’ tendency and ability to start an innovative rather than an imitative venture.

First, the action principles included in our entrepreneurship training should increase participants’ tendency and ability to establish an innovative rather than an imitative venture. Our entrepreneurship training incorporated a set of action principles related to innovation. For instance, our training involved action principles emphasizing to think outside the box and to avoid the status quo, to introduce unique products or services that are higher in quality or lower in price compared to existing products or services, and to design the product or service in a new way that both meets customer needs and aligns with the entrepreneur’s capabilities (c.f. Bischoff et al., 2014; Gielnik, Frese, et al., 2015). According to action regulation theory, such action principles guide participants’ action toward more innovative rather than imitative ventures (Frese, Bausch, Schmidt, Rauch, & Kabst, 2012; Frese et al., 2003; Glaub et al., 2014). The action principles illustrate the need of innovation, provide important knowledge how to successfully implement innovation, and can be easily applied by participants when starting a new venture after the training (Frese et al., 2003; Gielnik, Frese, et al., 2015).

Second, learning through action further enhances participants’ tendency and ability to start innovative rather than imitative ventures. Learning through action means that participants started their own micro-business in the course of the training. To start their own business, participants had to repeatedly perform entrepreneurial activities throughout the training. For example, they identified a promising business opportunity, approached potential investors to acquire necessary resources, negotiated with potential suppliers, developed product and marketing strategies, and determined optimal production and delivery processes. According to action regulation theory, repeatedly engaging in such entrepreneurial activities leads to routinization, i.e., the development of routines regarding these activities (Frese &
Zapf, 1994). The development of routines in turn allows participants to think more creatively about their entrepreneurial tasks and to generate and implement novel ideas while performing these tasks (Frese & Zapf, 1994; Frese, 2009). As such, participants’ engagement in entrepreneurial activities during the training enables them to accomplish entrepreneurial activities in a more creative way and thus to start more innovative ventures in the future.

Indeed, past research has provided empirical evidence that action-oriented trainings promote the innovativeness of participants’ ventures (Glaub et al., 2014; Solomon et al., 2013). We thus build on action regulation theory and submit the following hypothesis:

**Hypothesis 1:** Entrepreneurship training has a positive effect on venture innovation.

The Role of Entrepreneurial Passion in the Effect of Entrepreneurship Training on Venture Innovation

We further propose that entrepreneurial passion is an important mechanism explaining the effect of entrepreneurship training on venture innovation. Entrepreneurial passion is defined as “consciously accessible, intense positive feelings experienced by engagement in entrepreneurial activities associated with roles that are meaningful and salient to the self-identity of the entrepreneur” (Cardon et al., 2009, p. 517). As such, entrepreneurial passion comprises two dimensions, i.e., intense positive feelings and identity centrality (Cardon, Gregoire, Stevens, & Patel, 2013; Cardon et al., 2009). We argue that the two dimensions exert differential roles in the transmission of the effect of entrepreneurship training on venture innovation. Specifically, we argue that entrepreneurship training promotes participants’ positive feelings of entrepreneurial passion which in turn leads to venture innovation. In line with Cardon and colleagues (2013, 2009), we further propose that entrepreneurial identity centrality moderates the positive effect of positive feelings of entrepreneurial passion on venture innovation (see Figure 1). In the following, we first argue for the mediating role of positive feelings of entrepreneurial passion. We then argue for the moderating effect of entrepreneurial identity centrality. According to Cardon and colleagues (2009), an
entrepreneur’s positive feelings of passion and identity centrality can be directed toward three
types of entrepreneurial activities, i.e., inventing, founding, and developing a venture. We
focus on passion for inventing and founding because innovation mainly requires the invention
and foundation rather than the development of a venture (c.f. Cardon et al., 2009).

We draw upon goal setting theory (Locke & Latham, 2002) and control theory (Carver &
Scheier, 1982) to argue for a positive effect of entrepreneurship training on positive
feelings of entrepreneurial passion. In the action-oriented entrepreneurship training,
participants continuously make progress in starting and running their own venture. For
example, after identifying a promising business opportunity in the first week of the training,
participants learn to acquire necessary resources, win important suppliers, and make the first
sale. According to goal setting theory (Locke & Latham, 2002) and control theory (Carver &
Scheier, 1982), making progress and attaining sub-goals leads to positive feelings that
characterize passion. For instance, goal setting theory posits that successfully moving toward
a goal on a given task reduces the perceived negative discrepancy between the current state
and the desired goal and thus promotes positive feelings (Locke & Latham, 1990; Mento,
Locke, & Klein, 1992). Similarly, control theory proposes that people monitor and evaluate
their progress toward a desired goal. Progressing with a high rate compared to an expected
rate on a certain task produces positive feelings such as joy, excitement, and enthusiasm for
that task (Carver & Scheier, 1990, 1998, 2011; Carver, 2006). As such, participants’ progress
on starting and running their own venture in the course of the action-oriented entrepreneurship
training should lead to positive feelings of entrepreneurial passion. Indeed, past research
provided empirical evidence that making progress and attaining goals in the entrepreneurial
process leads to intense positive feelings underlying entrepreneurial passion (Gielnik,
Spitzmuller, Schmitt, Klemann, & Frese, 2015). We thus propose that participating in our
action-oriented entrepreneurship training fosters participants’ positive feelings of
entrepreneurial passion.
Positive feelings of entrepreneurial passion in turn predict venture innovation. There are at least two theoretical reasons leading us to this assumption. First, according to the broaden-and-build theory of positive emotions (Fredrickson, 2001), the positive feelings underlying entrepreneurial passion broaden entrepreneurs’ thought-action repertoire and allow them to come up with more creative solutions (Amabile, 1997; Cardon et al., 2009). As such, entrepreneurs high in positive feelings of passion are better able to identify opportunities and come up with new and unusual ideas which in turn is an important predictor of innovation (Baron & Tang, 2011; Shane, 2003). Second, according to Cardon and colleagues (2009), the positive feelings underlying entrepreneurial passion represent a strong motivational force that drives an entrepreneur’s behavior toward activities related to these feelings. The underlying assumption is that entrepreneurs experiencing positive feelings of passion for certain activities engage and persist in these activities in order to maintain the positive and pleasant feelings resulting from engaging in these activities (Cardon et al., 2009; Houser-Marko & Sheldon, 2006; Pham, 2004; Seo, Barrett, & Bartunek, 2004). Accordingly, the experience of positive feelings of passion for inventing and founding keeps an entrepreneur’s energy focused on activities that are related to the invention of new products, services, or processes, such as exploring market-disruptive opportunities and developing new ideas for products, services, or processes, and on activities required for establishing a new venture such as acquiring necessary resources (Cardon et al., 2013, 2009; Strese, Keller, Flatten, & Brettel, 2016). Given that the creation of an innovative venture requires putting more effort into both the exploration of opportunities and the establishment of the new venture compared to more imitative ventures (Samuelsson & Davidsson, 2009), entrepreneurs’ positive feelings of passion for inventing and founding should predict their tendency to start an innovative rather than imitative venture. Indeed, multiple scholars have argued and empirically shown that an entrepreneur’s passion fosters innovation (Amabile, 1997; Bierly, Kessler, & Christensen, 2000; Brink, 2015; Klaukien et al., 2013; Lyons, Lynn, & Bháird, 2016; Strese et al., 2016).
We hypothesized that entrepreneurship training has a positive effect on venture innovation. We have now argued that entrepreneurship training increases positive feelings of passion which in turn promotes venture innovation. Taken together, this indicates that the positive effect of entrepreneurship training on venture innovation is mediated through positive feelings of entrepreneurial passion. We therefore derive the following hypothesis:

_Hypothesis 2:_ Positive feelings of entrepreneurial passion mediate the positive effect of entrepreneurship training on venture innovation.

We also suggest that entrepreneurial identity centrality strengthens the positive effect of positive feelings of entrepreneurial passion on venture innovation (see Figure 1). Entrepreneurial identity centrality represents the centrality of entrepreneurial activities for one’s self-identity (Cardon et al., 2013; McCall & Simmons, 1966; Murnieks et al., 2014). According to Cardon and colleagues (2013, 2009), an entrepreneur’s identity centrality reinforces the positive effects of positive feelings of passion on favorable outcomes such as persistence and venture growth (see also Cardon & Kirk, 2015; Drnovsek et al., 2016). We follow their line of reasoning and argue that entrepreneurial identity centrality reinforces the positive effect of positive feelings of entrepreneurial passion on venture innovation. In general, positive feelings of entrepreneurial passion guide participants’ behavior toward starting innovative rather than imitative ventures. This effect should be larger in magnitude if the feelings are directed toward activities that are meaningful for one’s self-identity.

According to identity control theory, a person’s identity functions as a self-regulating control system that monitors and guides the person’s behavior toward identity-congruent behavior (e.g., Burke & Reitzes, 1981; Burke, 1991; Stets & Tsushima, 2001; Stryker & Burke, 2000). The underlying assumption is that people have the innate need to see themselves as consistent entities (Gecas, 2001; Rosenberg, 1979) and thus display a strong motivation to behave in accordance with their important identities (Burke & Reitzes, 1981; McCall & Simmons, 1978; Stets & Burke, 2000). Therefore, the identity control system reinforces behaviors that verify
the person’s identity and suppresses behaviors that are inconsistent with the identity (e.g., Stets & Burke, 2000). Applying this theoretical framework to entrepreneurship, a high identity centrality of inventing and founding activities should foster inventing and founding activities that result from positive feelings of entrepreneurial passion (Cardon et al., 2009). For people with a high identity centrality of inventing and founding, the inventing and founding activities which result from positive feelings of passion verify and reinforce their identity (Cardon et al., 2009). This process of self-verification motivates the entrepreneurs to maintain the self-verifying behavior and thus persist in these activities (Cardon et al., 2013, 2009). For people low in entrepreneurial identity centrality, in contrast, the inventing and founding activities shown as a consequence of their positive feelings of passion are incongruent with their important identities which results in a discrepancy and a motivation to reduce the discrepancy by disengaging from these activities that they do not identify with (Burke, 1991; Cardon et al., 2013; Stets & Burke, 2000; Stryker & Burke, 2000).

Consequently, the greater a person’s entrepreneurial identity centrality, the more effort the person puts into inventing and founding activities as a consequence of positive feelings of passion (Burke & Reitzes, 1981). As such, the effect of positive feelings of entrepreneurial passion on venture innovation is stronger in case of high identity centrality compared to low identity centrality. We thus submit Hypothesis 3:

**Hypothesis 3:** Identity centrality moderates the positive effect of positive feelings of entrepreneurial passion on venture innovation. The positive effect of positive feelings of entrepreneurial passion on venture innovation is stronger in case of high identity centrality than in case of low identity centrality.

**METHODS**

**Study Design and Procedure**

We conducted a randomized controlled field experiment with random assignment to a training group and a non-intervention control group. We employed a longitudinal pretest-
posttest design encompassing three measurement waves (T1-T3) over a period of 12 months. The first measurement wave (T1) took place in the month before the training. After the first measurement wave, we randomly assigned the participants to the training group or the control group. The training group received the action-oriented entrepreneurship training, whereas the control group received no training. The second measurement wave (T2) took place in the month after the training. The third measurement wave (T3) took place 12 months after the training. At the first and second measurement waves, we collected data using questionnaires. At the third measurement wave, we collected data with the help of structured face-to-face interviews. The randomized pretest-posttest design allows controlling for potential biases such as maturation, history, testing, and self-selection (Campbell, 1957).

Study Setting: The Entrepreneurship Training

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

Sample

The sample comprised 131 undergraduate students from University of Dar es Salaam in Tanzania. We informed students about the entrepreneurship training through student mailing lists, leaflets, and personal communication. The training was voluntary, not part of the curriculum, and accessible to students from all faculties and all years of study. We provided training participants with certificates stating successful participation at the end of the training.
To apply for the training, students had to complete an application form and a questionnaire. In total, 416 students applied for the training. Of these, we randomly assigned 220 students to the training group and 196 students to the non-intervention control group. The 220 students assigned to the training group were divided into four classes comprising approximately 55 students each. Out of the 220 students, 70 (31.8%) students did not attend the training regularly (i.e., participated in less than eight out of 12 sessions). We excluded the 70 students from the statistical analyses to ensure that all students included in the training group received complete treatment, resulting in a total number of 150 students in the training group. The total sample at the first measurement wave (T1) comprised 416 students with 220 students in the training group and 196 students in the control group. At the second measurement wave (T2), we were able to collect data from 324 students of our total sample, thereof 164 students from the training group and 160 students from the control group. At the third measurement wave (T3), we obtained data from 266 students, i.e., 143 students from the training group and 123 students from the control group. Reasons for non-response were refusal to continue study participation and non-availability. To run our analyses, we only included students who participated in all three measurement waves and who had a business at the time of the third measurement wave, leading to a final sample of 131 participants (31.5% of our initial sample) with 72 participants in the training group and 59 participants in the control group. In the final sample, 108 (82.4%) participants were male and 23 (17.6%) participants were female. Participants ranged in age from 19 to 37 years with an average age of 23.45 years ($SD = 2.21$). Most participants were in the third (43.5%), second (25.2%), or first (25.2%) year of study. The participants came from different faculties including Business School (24.4%), College of Natural and Applied Sciences (16.8%), College of Social Sciences (16%), and College of Humanities (14.5%).

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

**Measures**

*Venture innovation.* We assessed venture innovation at T3 using structured face-to-face interviews and subsequent expert ratings. The interviews were conducted by two research assistants who had received comprehensive interviewer training on interview techniques, note taking, adequate answers to questions and ambiguities usually raised by students, and avoiding typical interviewer errors. The interviewers used a structured interview guide that covered open-ended questions regarding the participant’s venture and recorded participants’ answers in writing during the interview. An independent subject-matter expert then rated participants’ answers for venture innovation. Venture innovation refers to the introduction of novel and useful products, services, or processes within a new venture (c.f. Amabile, 1996; Anderson et al., 2014; West & Farr, 1990). As such, venture innovation captures both the introduction of new and useful products or services to market (i.e., product or service innovations) and the implementation of new and useful ways of producing or rendering, delivering, and marketing the product or service (i.e., process innovations) (Barras, 1986; Damanpour & Gopalakrishnan, 2001; Damanpour, 2010; Knight, 1967). Accordingly, the expert rating covered the novelty and usefulness of four dimensions, resulting in a total number of eight items: novelty of product or service, novelty of production, novelty of distribution, novelty of marketing, usefulness of product or service, usefulness of production, usefulness of distribution, and usefulness of marketing. The subject-matter expert rated participants’ responses for these eight items using a 5-point Likert-type response scale ranging from 1 (*not at all different*) to 5 (*fundamentally different*) for the novelty items and ranging from 1 (*does not provide greater benefits at all*) to 5 (*provides significantly greater*

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Data are currently rated by a second subject-matter expert.
benefits) for the usefulness items. The subject-matter expert was familiar with the local market in Tanzania and was instructed to rate the novelty and usefulness of participants’ ventures compared to existing ventures in the market. The expert was blind toward participants’ assignment toward the training and control group. We computed the mean over the eight items to form our measure of venture innovation (Cronbach’s Alpha = .75).

Positive feelings of entrepreneurial passion. We ascertained positive feelings of entrepreneurial passion at T1 and T2. We used seven items from Cardon and colleagues’ (2013) measure. Cardon and colleagues (2013) developed three scales to target entrepreneurs’ passion for inventing, founding, and developing a business. We used four items from the passion for inventing scale and three items from the passion for founding scale because innovation mainly requires the invention and foundation of a new venture (c.f. Cardon et al., 2009). Of each scale, we selected the items capturing an entrepreneur’s intense positive feelings toward the activities. Sample items include “Scanning the environment for new opportunities really excites me” and “Nurturing a new business through its emerging success is enjoyable”. Participants provided their answers on a 5-point Likert-type response scale anchoring from 1 (strongly disagree) to 5 (strongly agree). Cronbach’s Alpha at T1 ($\alpha = .80$) and T2 ($\alpha = .84$) demonstrated good internal consistency.

Entrepreneurial identity centrality. We measured entrepreneurial identity centrality at T2 using two items from Cardon and colleagues’ (2013) measure. Cardon and colleagues (2013) drew upon Callero’s (1985) conceptualization of identity centrality and developed three single-item measures targeting an entrepreneur’s identity centrality of inventing, founding, and developing a business. We used the items that assessed the identity centrality of inventing and founding a venture. The two items were “Inventing new solutions to problems is an important part of who I am” and “Being the founder of a business is an important part of who I am”. Participants answered both items on a 5-point Likert-type response scale anchoring from 1 (strongly disagree) to 5 (strongly agree). The mean of the two items formed
the score of entrepreneurial identity centrality. Cronbach’s Alpha was $\alpha = .65$. Given that Cronbach’s Alpha is substantially affected by the number of items in a scale, the low Cronbach’s Alpha may reflect the low number of items capturing identity centrality rather than low reliability (Cortina, 1993).

*Entrepreneurship training.* We created a measure reflecting participants’ assignment to the training group or the control group. We coded the training group as “1” and the control group as “0”.

*Control variables.* To test whether randomization was successful and groups were equivalent before the training, we included participants’ gender ($0 = \text{female}, 1 = \text{male}$), entrepreneurial experience, and relatives owning a business as control variables. We measured all control variables at T1. We assessed gender because past research suggests that gender is an important predictor of entrepreneurial passion and venture innovation (Baron & Tang, 2011; Cardon et al., 2013; Torchia, Calabrò, & Huse, 2011). We included entrepreneurial experience and relatives owning a business as control variables because these variables may affect participants’ tendency to start innovative rather than imitative ventures (e.g., Davidsson & Honig, 2003; Samuelsson & Davidsson, 2009). To assess entrepreneurial experience, we asked participants whether they were the owner of a business at the time of the study or whether they had ever started a business in the past ($0 = \text{no}, 1 = \text{yes}$). We measured relatives owning a business by asking participants whether anybody in their family owned a business ($0 = \text{no}, 1 = \text{yes}$).

**RESULTS**

**Preliminary Analyses**

Table 1 presents the means, standard deviations, and correlations of all study variables. Given that some study variables were substantially related, we tested for multicollinearity by computing variance inflation factor (VIF) scores for all variables in all statistical models. All VIF scores were below 2.5, suggesting that multicollinearity was not a concern in our study.
(Cohen, Cohen, West, & Aiken, 2013). We conducted independent-samples t-tests to test for significant differences between the training group and the control group at T1. Analyses revealed that there were no significant differences between the training group and the control group in terms of any study variable assessed at T1 ($p < .05$), indicating that the two groups were equivalent before the training.

**Hypothesis Testing**

We performed linear regression analyses to test our hypotheses. We conducted the linear regression analyses using the package “stats” incorporated in the statistical software R (R Core Team, 2014). We controlled for gender, entrepreneurial experience, and relatives owning a business in all analyses. We additionally controlled for entrepreneurship training when testing Hypothesis 3. Results are displayed in Table 2.

Hypothesis 1 posits that entrepreneurship training has a positive effect on venture innovation. To test Hypothesis 1, we computed a linear regression model with entrepreneurship training as predictor variable and venture innovation at T3 as dependent variable. Table 2 presents the results. As shown in Table 2, entrepreneurship training had a positive and marginally significant effect on venture innovation at T3 ($b = 0.11$, $SE = 0.07$, $t(126) = 1.71$, $p < .10$), providing marginal support for Hypothesis 1.

Hypothesis 2 states that the positive effect of entrepreneurship training on venture innovation is mediated by positive feelings of entrepreneurial passion. To test this hypothesis, we first ran a linear regression model with entrepreneurship training as predictor variable and positive feelings of entrepreneurial passion at T2 as dependent variable. We controlled for positive feelings of entrepreneurial passion at T1 in our analyses to predict change rather than absolute levels of positive feelings of entrepreneurial passion. We then conducted a linear regression model with positive feelings of entrepreneurial passion at T2 as predictor variable and venture innovation at T3 as dependent variable. Table 2 provides the results. In contrast to expectations, entrepreneurship training did not have a significant effect on change in positive
feelings of entrepreneurial passion ($b = 0.05$, $SE = 0.08$, $t(125) = 0.54$, $ns$). The non-significant effect of entrepreneurship training on positive feelings of entrepreneurial passion contradicts a mediation effect. We thus did not find support for Hypothesis 2.

Hypothesis 3 posits that entrepreneurial identity centrality moderates the effect of positive feelings of entrepreneurial passion on venture innovation. To test Hypothesis 3, we calculated a linear regression model regressing venture innovation at T3 on the interaction between positive feelings of entrepreneurial passion and entrepreneurial identity centrality at T2. We entered the control variables in step 1, the main effects of positive feelings of entrepreneurial passion and entrepreneurial identity centrality in step 2, and the interaction term between positive feelings of entrepreneurial passion and entrepreneurial identity centrality in step 3 (Aiken & West, 1991). We mean-centered the predictor and moderator variables to facilitate interpretation of regression coefficients (Preacher, Curran, & Bauer, 2006). Table 2 displays the results. Results revealed that the interaction effect between positive feelings of entrepreneurial passion and entrepreneurial identity centrality on venture innovation was positive and marginally significant ($b = 0.22$, $SE = 0.13$, $t(123) = 1.67$, $p < .01$). We tested whether the significant interaction effect was in line with the hypothesized pattern by employing simple slope analyses (Aiken & West, 1991). We regressed venture innovation on positive feelings of entrepreneurial passion for low levels of entrepreneurial identity centrality (i.e., one standard deviation below the mean) and high levels of entrepreneurial identity centrality (i.e., one standard deviation above the mean). Figure 2 illustrates the results. Consistent with expectations, positive feelings of entrepreneurial passion was positively and marginally significantly related to venture innovation in case of high entrepreneurial identity centrality ($t = 1.78$, $p < .10$). The relationship between positive feelings of entrepreneurial passion and venture innovation was weaker and non-significant in case of low entrepreneurial identity centrality ($t = -0.39$, $ns$). Taken together, these results provide marginal support for Hypothesis 3: Entrepreneurial identity centrality moderates the
effect of positive feelings of entrepreneurial passion on venture innovation. The positive effect of positive feelings of entrepreneurial passion on venture innovation is stronger in case of high entrepreneurial identity centrality compared to low entrepreneurial identity centrality.

DISCUSSION

Innovation is an important driver of venture success and economic growth. However, our theoretical understanding of how to promote venture innovation is surprisingly limited. The goal of this study was to advance our theoretical understanding of antecedents of venture innovation by investigating the effects of entrepreneurship training and entrepreneurial passion on venture innovation. Building on past entrepreneurship and innovation research, we develop a theoretical model proposing that entrepreneurship training has a positive effect on venture innovation and that entrepreneurial passion is a key mechanism explaining this effect. Specifically, we suggest that the effect of entrepreneurship training on venture innovation is mediated by positive feelings of entrepreneurial passion and moderated by entrepreneurial identity centrality. To test our theoretical model, we conducted a randomized controlled field experiment and employed a pretest-posttest design with three measurement waves over a period of 12 months. Analyses revealed a marginally significant positive effect of entrepreneurship training on venture innovation, substantiating the important role of entrepreneurship trainings for economic growth. Moreover, our findings showed that the positive effect of entrepreneurship training on venture innovation was not mediated by positive feelings of entrepreneurial passion. However, our findings revealed a marginally significant interaction effect between positive feelings of entrepreneurial passion and entrepreneurial identity centrality on venture innovation. Positive feelings of entrepreneurial passion marginally significantly predicted venture innovation in case of high identity centrality but not in case of low identity centrality. Our findings hold significant implications for both theory and practice.

Theoretical Implications
First, the results of the present study contribute to our theoretical understanding of antecedents of venture innovation by investigating the predictive roles of entrepreneurship training and entrepreneurial passion. Scholars have widely acknowledged that entrepreneurs have a strong impact on firm-level outcomes such as venture innovation (e.g., Baum et al., 2001; Baum & Locke, 2004; Frese et al., 2007; Rauch & Frese, 2007). However, our theoretical understanding of how and why entrepreneurs promote the innovativeness of their ventures is limited (Baron & Tang, 2011). The limited number of studies investigating antecedents of venture innovation has mainly focused on an entrepreneur’s stable dispositions such as creativity (Baron & Tang, 2011), dispositional affect (Baron & Tang, 2011), and willingness to invest financial resources (Chandy & Tellis, 1998). We go beyond this research by examining more modifiable characteristics as predictors of venture innovation. Using a randomized controlled field experiment, we provide empirical evidence that action-oriented entrepreneurship trainings systematically increase participants’ tendency to start innovative rather than imitative ventures. As such, our study provides the first empirical evidence that venture innovation can be systematically fostered with the help of targeted interventions. Moreover, we theorize and provide evidence that an entrepreneur’s positive feelings of entrepreneurial passion interact with his or her entrepreneurial identity centrality to predict venture innovation. As such, our study represents an important step toward a better understanding of key drivers of venture innovation (Baron & Tang, 2011). Future studies may take the predictive roles of entrepreneurship training and entrepreneurial passion into account in order to fully understand antecedents of venture innovation.

Second, our study adds to entrepreneurship education research by examining the effects of an action-oriented entrepreneurship training on positive feelings of entrepreneurial passion and venture innovation. Past research has provided robust evidence that entrepreneurship trainings predict participants’ tendency to start a business and succeed with these businesses (Martin et al., 2013). We contribute to this literature by providing theoretical and empirical
evidence for the predictive validity of entrepreneurship training for venture innovation. As such, our research illustrates that participating in an entrepreneurship training does not only foster people’s tendency to start a business but also their tendency and ability to start an innovative rather than imitative venture.

Third, our research provides a better understanding of the predictive power of entrepreneurial passion for venture innovation. Past research has repeatedly pointed toward the central role of passion in entrepreneurship, describing passion as a strong motivational driver promoting an entrepreneur’s cognitions, behaviors, and success (e.g., Bird, 1988; Cardon et al., 2009, 2005; Drnovsek et al., 2016; Smilor, 1997). According to Cardon and colleagues (2009), the motivational force underlying entrepreneurial passion arise from two components inherent in passion, i.e., intense positive feelings and identity centrality. However, past studies have mainly focused on the affective component and thus neglected the identity component underlying entrepreneurial passion (e.g., Baum et al., 2001; Baum & Locke, 2004; Gielnik, Spitzmuller, et al., 2015; Murnieks et al., 2014). We go beyond these studies and illuminate the interactive effects of positive feelings of entrepreneurial passion and entrepreneurial identity centrality on venture innovation. By disentangling entrepreneurial passion into its two components, we show that entrepreneurial identity centrality enables the positive effect of positive feelings of entrepreneurial passion on venture innovation such that positive feelings of entrepreneurial passion predict venture innovation only if entrepreneurial identity centrality is high. These findings are in line with Cardon and colleagues’ (2009) theory of entrepreneurial passion and illustrate how positive feelings and identity centrality interact to induce the motivational effects of entrepreneurial passion. Future research should thus take the interactive effect of both components into account in order to better understand the potential impact of entrepreneurial passion (Collewaert, Anseel, Crommelinck, De Beuckelaer, & Vermeire, 2016).

**Practical Implications**
The results of our study also offer important practical implications. First, our results indicate that entrepreneurship trainings promote venture innovation. As such, our study points toward the important role of entrepreneurship trainings for fostering the innovativeness of established ventures in countries that are characterized by a low propensity to innovate. In addition, our findings reveal that positive feelings of entrepreneurial passion and entrepreneurial identity centrality are important mechanisms contributing to venture innovation. While our action-oriented entrepreneurship training did not foster participants’ positive feelings of entrepreneurial passion, past research suggests that entrepreneurship trainings may be effective means to promote participants’ positive feelings of entrepreneurial passion, entrepreneurial identity centrality, and thus venture innovation (De Clercq, Honig, & Martin, 2013; Donnellon, Ollila, & Middleton, 2014; Gielnik, Spitzmuller, et al., 2015; Rigg & O'Dwyer, 2012). For example, De Clercq and colleagues (2013) suggested promoting entrepreneurs’ positive feelings of passion by using role models and by pointing out the potential benefits resulting from entrepreneurship. As such, practitioners may benefit from integrating entrepreneurship trainings into the university curriculum and set a specific focus on elements that foster participants’ positive feelings of entrepreneurial passion and entrepreneurial identity centrality.

**Strengths and Limitations**

Our study stands out due to its randomized controlled field experimental design comprising three measurement waves over a period of 12 months. Randomized controlled field experiments fulfill the highest scientific standards (Reay et al., 2009). The randomized pretest-posttest design allowed us drawing strong causal conclusions by controlling for potential methodological biases such as maturation, history, testing, and self-selection (Campbell, 1957). Moreover, our longitudinal study design with three measurement waves over 12 months enabled us to test the links between short-term and long-term effects of entrepreneurship trainings (Martin et al., 2013). In addition, we assessed venture innovation
using interviews and independent ratings by a subject-matter expert. In the interviews, participants were asked to give detailed descriptions of their ventures in order to gather sufficient information for the rating and to detect social desirable answers. Independent ratings are less susceptible to methodological biases, such as common method bias and percept-percept inflation, and thus overcome limitations of the more common self-report measures in innovation research (Anderson, de Dreu, & Nijstad, 2004; Anderson et al., 2014; Hülsheger, Anderson, & Salgado, 2009; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). As such, our study answers repeated calls for more methodologically rigorous studies investigating antecedents and outcomes of entrepreneurship education and innovation (Anderson et al., 2014; Glaub & Frese, 2011; Martin et al., 2013; Pittaway & Cope, 2007). We contribute to the emerging field of entrepreneurship and innovation research by rigorously testing the causal links between entrepreneurship training, entrepreneurial passion, and venture innovation.

Despite the methodologically rigorous study design, our study is not without limitations which should be addressed by future research. A potential limitation may be the context of our study. We conducted our study with undergraduate students in Tanzania. Tanzania is a developing country with a gross national income per capita of 930 USD compared to a gross national income per capita of 55,200 USD in the United States (The World Bank, 2015). The student status and low economic status of our participants may have diminished the generalizability of our results due to three reasons. First, it is important to note that developing countries such as Tanzania exhibit higher entrepreneurship rates than more developed countries (Koster & Rai, 2008; Prieger, Bampoky, Blanco, & Liu, 2016). The relatively high entrepreneurship rate in Tanzania implies that the participants of our study are more inclined toward engaging in entrepreneurship and thus toward starting a business after acquiring the necessary knowledge and skills in our entrepreneurship training than people living in more developed countries. While this may lead to an increased effect of
entrepreneurship trainings on business creation in developing countries such as Tanzania, however, it should not affect the impact of entrepreneurship trainings on venture innovation which we focus on in this study. However, the impact of entrepreneurship trainings on venture innovation could be higher in our context compared to more developed countries, given that the tendency to engage in innovation is relatively low in countries such as Tanzania, leading to a higher potential of entrepreneurship training to increase the initially low innovation rate in these countries (Gielnik et al., 2012; Glaub et al., 2014; Herrington et al., 2010; Kiggundu, 2002; Rosenbusch et al., 2011). We acknowledge that the effect of entrepreneurship trainings on venture innovation may be lower in countries with higher initial innovation rates. However, we think that our results on the effect of entrepreneurship training on venture innovation in Tanzania are particularly valuable due to several reasons. First, it is important to note that the need to foster innovation is particularly high in countries with low innovation rates. Second, a major goal of entrepreneurship trainings is to reduce poverty and to promote economic development. As such, it is particularly important to assess the effectiveness of entrepreneurship trainings in developing countries (Mead & Liedholm, 1998; van Praag & Versloot, 2007). Third, people living in developing countries represent the majority of the world population and thus need to be represented in research in order to generate representative results (Arnett, 2008; Bruton, 2010; Reynolds, 2012). Against this background, past research has called for more management and entrepreneurship research in developing countries such as Tanzania (Bruton, 2010; George, Corbishley, Khayesi, Haas, & Tihanyi, 2016; Reynolds, 2012). We answer these repeated calls by illuminating the potential effects of entrepreneurship trainings in developing countries which suffer from high poverty and unemployment rates.

Second, a concern may be that university students have better access to financial resources than non-educated people living in developing countries. Given that financial resources are required to start innovative businesses (Sorescu, Chandy, & Prabhu, 2003), the
training effect on venture innovation shown in this study may be lower in non-academic samples. We concur, and consider it as an important task of future research to replicate our findings with non-academic samples in developing countries. However, we also note that university students are the primary target group of entrepreneurship trainings. In fact, a recent meta-analysis revealed that most entrepreneurship trainings have been conducted at universities (Martin et al., 2013). As such, our study adds to our theoretical understanding of entrepreneurship training effects for university students in developing countries, where most entrepreneurship trainings take place (Martin et al., 2013).

Third, one might criticize that our sample consists of students having applied for an entrepreneurship training, thereby limiting our analyses to students that are initially inclined toward entrepreneurship. We acknowledge that our results may be less applicable to students that are not interested in entrepreneurship. However, we think that the limited generalizability toward students not being inclined toward entrepreneurship does not limit the value of our results, given that our goal was to investigate factors that influence people’s tendency to start a more innovative or more imitative venture. In sum, we argue that limited generalizability is less of a concern for this study. Nevertheless, an important task for future research is to replicate our results using both non-academic samples in developing countries and samples in more developed countries.

In addition, our study could be criticized for including survival bias. Our study solely involves participants that owned a venture one year after the training. Focusing on these participants may have biased our results. For instance, participants in the control group could have started an innovative venture directly after the training which, however, failed due to lack of skills or entrepreneurial passion (c.f. Rosenbusch et al., 2011). Future studies may thus investigate the effects of entrepreneurship trainings on entrepreneurial passion and venture innovation more deeply by asking all participants of the initial training and control groups for their passionate feelings and innovative endeavors after the training.
Finally, scientists may argue that the positive effect of entrepreneurship training displayed in this study is mainly due to trainers’ attention or expectations toward the participants during the entrepreneurship training (Eden, 1990; Rosenthal, 1994). While attention and expectation effects may generally cause observed training effects, we consider it unlikely that these effects affect crucial decisions such as the decision to start an innovative or imitative venture. Therefore, we think that attention or expectation effects are less likely to bias our results. In addition, one may argue that our significant differences between the training and control group in venture innovation are due to demoralization of participants not receiving the training rather than increasing participants’ effort in the training group (Gielnik, Frese, et al., 2015). However, theoretical evidence on the initial low innovation rate indicates an increase in participants’ tendency to start an innovative venture in the training group rather than a decrease in participants’ tendency to start an innovative venture in the control group. Moreover, we would expect that a demoralization of participants in the control group prevents them from starting a business at all rather than causing them to start an imitative one. Yet, to substantiate this study’s results on the effect of entrepreneurship training on venture innovation, future research should investigate the innovativeness of participants’ ventures both before and after the training.

**Directions for Future Research**

Our study points toward several avenues for future research. First, future research could extend our theoretical model by investigating the role of additional mediating mechanisms. Our findings reveal that entrepreneurship training has a marginally significant positive impact on venture innovation. In contrast to expectations, this effect was not mediated by positive feelings of entrepreneurial passion, suggesting that there are other mediating mechanisms transmitting the effect of entrepreneurship training on venture innovation. Indeed, past research points toward further mechanisms explaining the effect of an action-oriented entrepreneurship training on venture innovation, such as entrepreneurial self-efficacy.
venture innovation (Gielnik, Frese, et al., 2015; Slavec & Drnovsek, 2013; Zhao, Seibert, & Hills, 2005) and business opportunity identification (DeTienne & Chandler, 2004; Gielnik, Krämer, et al., 2014; Gielnik, Frese, et al., 2015). For instance, Gielnik and colleagues (2015) showed that participating in an action-oriented entrepreneurship training increases the number of identified business opportunities. The number of identified business opportunities, in turn, is an important predictor of venture innovation (Gielnik, Krämer, et al., 2014). As such, business opportunity identification may be an important mechanism underlying the effect of entrepreneurship training on venture innovation. Future research should provide a more-fine-grained investigation of these mechanisms in order to better understand the processes explaining the impact of entrepreneurship training on venture innovation.

Second, future research could build on our study and investigate the mediating role of positive feelings of entrepreneurial passion in the link from entrepreneurship training to venture innovation more deeply. In our study, we could not confirm a mediating effect of participants’ positive feelings of entrepreneurial passion on the link from entrepreneurship training to venture innovation. However, a more fine-grained investigation may reveal mediating effects of specific types of positive feelings of entrepreneurial passion. Cardon and colleagues (2013, 2009) distinguished between three different types of passion, i.e., entrepreneurial passion for inventing, founding, and developing a business. The different types of passion may be differentially affected by entrepreneurship training and may exert differential effects on venture innovation (Cardon et al., 2013, 2009; Ho & Pollack, 2014; Klaukien et al., 2013). For instance, entrepreneurial passion for inventing should primarily impact the innovativeness of a new venture, whereas entrepreneurial passion for developing should play a stronger role for the growth of the new venture (Cardon et al., 2009). Against this background, future studies may expand our theoretical model by examining the differential antecedents and outcomes of the different types of passion. Such research would contribute to an integrated understanding of the mediating role of positive feelings of...
entrepreneurial passion in the effect of entrepreneurship training on venture outcomes (Drnovsek et al., 2016; see also Huyghe, Knockaert, & Obschonka, 2016).

Third, a promising direction for future research is to investigate the predictive power of entrepreneurship training for participants’ entrepreneurial passion and venture innovation over time. Our study reveals that entrepreneurship training does not have a short-term effect on positive feelings of entrepreneurial passion directly after the training. A potential reason for this unexpected result may be the small time lag between entrepreneurship training and positive feelings of entrepreneurial passion. Past research suggests that study designs using small time lags may fail to detect existing effects, giving that some causal effects take time to unfold (Gielnik, Barabas, et al., 2014; Mitchell & James, 2001; Ployhart & Vandenberg, 2010). In fact, especially complex tasks such as entrepreneurship may require longer time lags to produce causal effects between entrepreneurship training and positive feelings of entrepreneurial passion (Ancona, Goodman, Lawrence, & Tushman, 2001). Accordingly, future research should investigate the predictive validity of entrepreneurship training for entrepreneurial passion over a longer period of time in order to fully understand the link leading from entrepreneurship training to positive feelings of entrepreneurial passion.

Moreover, it would be interesting to examine the impact of entrepreneurship training on venture innovation and success over a longer period of time. We show that entrepreneurship training marginally increases participants’ tendency to start an innovative rather than imitative venture one year after the training. However, the introduction of innovative products, services, or processes poses severe challenges and risks to small and resource-scarce new ventures (Acs & Audretsch, 1988; Nohria & Gulati, 1996; Rosenbusch et al., 2011; Van de Ven, 1986; Vossen, 1998). Block and MacMillan (1993) noted that innovation results in temporary unprofitability and may pay off only in the long run. As such, it would be interesting to investigate whether the participation in an entrepreneurship training also enables participants to overcome the period of temporary unprofitability and to lead their innovative
ventures to long-term success. Such research would provide interesting insights into the maintenance of training effects over time, thereby contributing to a better understanding of the short- and long-term effects of entrepreneurship training.

Finally, an interesting avenue for future research is to examine reciprocal relationships between positive feelings of entrepreneurial passion and venture innovation over time. Our results reveal that positive feelings of entrepreneurial passion foster participants’ tendency to start an innovative venture if entrepreneurial centrality identity is high. Past research suggests that engaging in innovation activities in turn fosters participants’ feelings of entrepreneurial passion for those activities (Gielnik, Spitzmuller, et al., 2015). As such, venture innovation may have a recursive effect on entrepreneurs’ positive feelings of passion, leading to a reciprocal and self-enhancing upward spiral of positive feelings of entrepreneurial passion and venture innovation over time (c.f. Lindsley, Brass, & Thomas, 1995). Future research investigating such upward spirals may add to our theoretical understanding of the dynamic processes resulting from participating in entrepreneurship trainings.

Conclusion

We know that venture innovation drives venture success. However, we only know little about how to promote venture innovation. In this study, we aimed at increasing our theoretical understanding of venture innovation by investigating the predictive roles of entrepreneurship training and entrepreneurial passion. Our findings reveal that entrepreneurship training is an effective means to promote venture innovation. We further show that an entrepreneur’s positive feelings of passion and identity centrality interact to predict venture innovation. We hope that our study will pave the way for future research moving our theoretical understanding of how to promote venture innovation further forward.
REFERENCES


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FIGURE 1

Theoretical Model on the Role of Entrepreneurship Training and Entrepreneurial Passion for Venture Innovation
FIGURE 2

Simples Slopes for the Effect of Positive Feelings of Entrepreneurial Passion on Venture Innovation for Low Levels of Entrepreneurial Identity Centrality (i.e., One Standard Deviation Below the Mean) and High Levels of Entrepreneurial Identity Centrality (i.e., One Standard Deviation Above the Mean)
### TABLE 1

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.82</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Entrepreneurial experience&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.54</td>
<td>0.50</td>
<td>0.18&lt;sup&gt;*&lt;/sup&gt;</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Relatives owning a business&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.66</td>
<td>0.48</td>
<td>-0.21&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.11</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4. Entrepreneurship training</td>
<td>0.55</td>
<td>0.50</td>
<td>-0.14</td>
<td>-0.15&lt;sup&gt;†&lt;/sup&gt;</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Entrepreneurial identity centrality</td>
<td>4.49</td>
<td>0.53</td>
<td>0.03</td>
<td>0.15&lt;sup&gt;†&lt;/sup&gt;</td>
<td>0.20&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-0.15&lt;sup&gt;†&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PF of entrepreneurial passion T1</td>
<td>4.42</td>
<td>0.47</td>
<td>-0.12</td>
<td>0.21&lt;sup&gt;**&lt;/sup&gt;</td>
<td>0.21&lt;sup&gt;*&lt;/sup&gt;</td>
<td>-0.01</td>
<td>0.35&lt;sup&gt;***&lt;/sup&gt;</td>
<td></td>
<td></td>
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<tr>
<td>7. PF of entrepreneurial passion T2</td>
<td>4.33</td>
<td>0.53</td>
<td>-0.03</td>
<td>0.10</td>
<td>0.25&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.04</td>
<td>0.69&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.47&lt;sup&gt;***&lt;/sup&gt;</td>
<td></td>
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<tr>
<td>8. Venture innovation</td>
<td>1.76</td>
<td>0.37</td>
<td>-0.14</td>
<td>0.10</td>
<td>0.13</td>
<td>0.15&lt;sup&gt;†&lt;/sup&gt;</td>
<td>0.07</td>
<td>0.25&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.15</td>
</tr>
</tbody>
</table>

*Note. N = 131 participants. PF = Positive feelings. <sup>a</sup> 0 = female, 1 = male. <sup>b</sup> 0 = no, 1 = yes.*

<sup>†</sup> p < .10
<sup>*</sup> p < .05
<sup>**</sup> p < .01
<sup>***</sup> p < .001
## TABLE 2

**Results from Linear Regression Analyses Predicting Positive Feelings of Entrepreneurial Passion and Venture Innovation**

<table>
<thead>
<tr>
<th>Control variables</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>0.09</td>
<td>0.11</td>
<td>-0.14</td>
<td>-0.13</td>
<td>-0.13</td>
<td>-0.11</td>
</tr>
<tr>
<td>Entrepreneurial experience</td>
<td>0.09</td>
<td>0.07</td>
<td>-0.02</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>Relatives owning a business</td>
<td>0.07</td>
<td>0.07</td>
<td>0.18*</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
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</table>

<table>
<thead>
<tr>
<th>Main effects</th>
<th></th>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurship training</td>
<td>0.05</td>
<td>0.08</td>
<td>0.11†</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PF of entrepreneurial passion T2</td>
<td></td>
<td></td>
<td>0.09</td>
<td>0.09</td>
<td>0.07</td>
<td>0.09</td>
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</table>

**Interaction effect**

<table>
<thead>
<tr>
<th>PF of entrepreneurial passion T2 x Entrepreneurial identity centrality</th>
<th></th>
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<tbody>
<tr>
<td>0.22†</td>
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</table>

**Deviance (-2LogLikelihood)**

|                     | 165.35  | 165.05  | 107.75  | 104.76  | 103.16  | 100.21  |

*Note. N = 131 participants. Unstandardized regression coefficients (b’s) are shown. PF = Positive feelings. a 0 = female, 1 = male. b 0 = no, 1 = yes.  
† p < .10  
* p < .05  
*** p < .001