

# **The relationship between entrepreneurial passion and cognitive styles and their role in entrepreneurial success**

## **Abstract:**

*Although existing studies have improved our understanding of entrepreneurial passion and cognitive styles, they provide relatively little insight into how these two underlying psychological phenomena interact with each other and how they function in an entrepreneurship context. This study aims to explore the effect of entrepreneurial passion on the two different cognitive styles an entrepreneur can use to process information and how their passion and cognitive style affect successfulness. Based on survey data from 155 entrepreneurs across different states within the USA, several hypotheses involving entrepreneurial passion, cognitive style and entrepreneurial success (both in financial and non-financial terms) are tested. Results of linear regression analyses yield several significant results. Firstly, entrepreneurial passion has a positive relationship with both the analytical and intuitive cognitive style. Furthermore, empirical results show that the level of entrepreneurial passion positively affects the level of entrepreneurial success. Additionally, usage of the intuitive cognitive style also positively affects the level of entrepreneurial success. These findings contribute to the academic discussion of underlying psychological characteristics within entrepreneurship and suggest that entrepreneurial passion and cognitive styles both significantly influence successfulness of an entrepreneur.*

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## 1. Introduction

### 1.1 Research background and goal

Entrepreneurs form the backbone of economies and society and therefore many researchers have tried to gain insights into entrepreneurship (Carland & Carland, 2004; Day, 2000). Research thus far has tried to explain entrepreneurial success and its indicators, however, due to its complexity, a lack of clarity still exists and the subject requires more detailed investigation (R. A. a. H. Baron, R.A., 2011). In order to gain a better understanding of the essence of entrepreneurship, how it emerges and how it develops, it is imperative to understand entrepreneurial cognition (Krueger, 2003, 2007; Mitchell et al., 2002). Rationality and intuition are two contrasting cognitive modes that reflect distinctive ways of processing information (Sadler-Smith, 2004).

Recently, these cognitive processes that enable entrepreneurs' unique achievements have gained more attention (Grégoire, Corbett, & McMullen, 2011). The cognitive style, in other words the system an individual uses to organize and process information, is a concept which has been researched extensively in the past decades, including its effects on entrepreneurship (Messick, 1984). For example, research shows that cognitive style affects many aspects including innovation, decision making, organizational behavior, communication, problem solving and learning (Hayes & Allinson, 1994; Hough & Ogilvie, 2005; Visser, Faems, Visscher, & Weerd-Nederhof, 2014). Although these concepts are not only relevant to entrepreneurs, several past works have claimed that because of the particular challenges they face (such as dealing with uncertainty, ambiguity, limited resources, or other liabilities), individual entrepreneurs (and individuals within entrepreneurial organizations) have to 'think' differently, which makes the cognitive style even more important (Etzkowitz, 1998; Russell, 1999). Each decision could be decisive for the future of a business, with the odds of failure of new ventures being higher than the odds of success (Mullins & Forlani, 2005). The road to success for a new venture is one with many hurdles, as the benefits of first-mover advantage are a topic of discussion (Boulding & Christen, 2001). These entrepreneurs will face decisions with high uncertainty and complexity since there are often no historical trends, no previous levels of performance, and little if any specific market information (Covin & Slevin, 1991; Gartner, Bird, & Starr, 1992; D. Miller, 1984). Particularly, novice entrepreneurs starting a new

venture will have difficulties dealing with these problems, as expertise is a key component in the successfulness of new ventures, which makes the cognitive style of novice entrepreneurs an interesting field of research (Dew, Read, Sarasvathy, & Wiltbank, 2009; Mitchell & Chesteen, 1995).

Recently, researchers started paying more attention to the antecedents of cognitive styles. In particular, Cardon et al. (2009) argues that entrepreneurial passion could act as an antecedent of entrepreneurs' cognitions. Entrepreneurial passion, in essence a positive feeling experienced by engagement in entrepreneurial activities, is a relatively new concept that has been gaining attention in business research. The concept of entrepreneurial passion has recently been explored by several researchers, covering its general nature and theorizing about its effects. Whereas the generation of theories and discussion of potential outcomes are plentiful, only limited empirical research exists about entrepreneurial passion. Additionally, empirical evidence that exists is not conclusive, for example while Murnieks et al. (2014) found empirical evidence that shows that entrepreneurial passion has a direct effect on individual behavior, Baum and Locke (2004) did not manage to find a direct effect on new venture performance (Baum & Locke, 2004; Murnieks, Mosakowski, & Cardon, 2014). Moreover, the role of entrepreneurial passion in the entrepreneurial process and obtainment of grant funding was researched, however, again no direct relationship was found (Chen, Yao, & Kotha, 2009). A possible explanation for this could be that entrepreneurial passion influences cognitive style, which in turn influences the discussed variables and others.

One of the variables that may be affected by the cognitive style and/or entrepreneurial passion is entrepreneurial success. Entrepreneurs perceive entrepreneurial success as the presence of both personal and macro level variables which is best captured by more than financial and economic indicators (Fisher, Maritz, & Lobo, 2014). Success starts with actions taken in order to reach set goals and strategies (Rauch & Frese, 2000). Before reaching success, entrepreneurs have to take decisions which can be influenced by their cognitive style (Epstein, Pacini, Denes-Raj, & Heier, 1996; Rauch & Frese, 2000). A study on financial and non-financial firm performance found that cognitive style significantly affects financial performance. The results of this study showed a positive relationship between the intuitive style and financial and non-financial performance (Sadler-Smith, 2004). Furthermore, numerous researchers have argued for the importance of entrepreneurial passion for potential success of an entrepreneur (Cardon, 2008; Cardon, Wincent, Singh, & Drnovsek, 2009; Chen et al., 2009). Considering the fact that entrepreneurship is at the heart of national advantage and more important than ever for economic growth, it is critical to gain more insight in influential variables such as the cognitive style and passion of an entrepreneur (Porter, 1990; Wennekers & Thurik, 1999).

## 1.2 Research Gap

After their review of cognition in entrepreneurship, Gregoire et al. (2011) stress the lack of attention given to antecedents of the cognitive style and their interaction with other variables. They state that a valuable contribution could be made by exploring which factors influence the acquisition and development of cognition, which appear to aid individuals in their entrepreneurial endeavors. Cardon et al. (2009) do not only confirm this need, in their theoretical work they claim that entrepreneurial passion could be influencing the cognition of an entrepreneur. Thus far no empirical research has covered the interaction between the cognitive style of an entrepreneur and entrepreneurial passion. Therefore, this study aims to explore this gap and explain a part of the entrepreneurial process by zooming in on the cognitive style and entrepreneurial passion of an entrepreneur. Furthermore, while some effects of cognitive style and entrepreneurial passion have been described, a clear answer for the effect

on entrepreneurial success is lacking thus far. Since becoming successful is often the ultimate end goal of many entrepreneurs, this study aims to explore the role of cognitive styles and entrepreneurial passion in entrepreneurial success. Concluding, the goal of this research is to investigate the relationship between entrepreneurial passion and cognitive styles of an entrepreneur and its effect on entrepreneurial success.

### 1.3 Research questions

Based on the gap in the current literature, the following main research question and sub question were developed.

- To what extent is entrepreneurial passion driving the choice for differences in cognitive styles?
  - o To what extent do entrepreneurial passion and cognitive style influence entrepreneurial success?

### 1.4 Relevance and contribution

The importance of entrepreneurial style and in particular cognitive style is extensively documented in existing literature. However, while some studies imply that these concepts may influence each other, no empirical research has covered this potential interaction (Cardon, Wincent, et al., 2009; Epstein, 1994). This study aims to address that gap and as a result make a contribution to the existing literature on cognitive styles and entrepreneurial passion. Results could give researchers and entrepreneurs insight in how entrepreneurial passion and cognitive style influence each other and the consequences for the successfulness of an entrepreneur. Subsequently, entrepreneurs could apply this knowledge to improve business processes. While adapting to the most appropriate style or level of passion may be difficult, entrepreneurs would be better prepared and have an increased understanding how their characteristics influence the business process (Epstein, 1994). Investors could use the empirical results to determine optimal entrepreneur characteristics in order to find entrepreneur who are most likely to succeed and deliver the investors the promised return on investment (Chen et al., 2009). Finally, researchers, other individuals and institutions that aim to aid entrepreneurial processes by means of policy development could gain new knowledge in this field regarding the interaction between these concepts. This could aid them in future research and in creating a better general understanding of the subject as a whole which could enhance policy decisions aimed at stimulating entrepreneurship.

### 1.5 Outline

This study consists of ten chapters. The first chapter is an introduction including the background, research gap and goal, and relevancy. Chapter two describes the theoretical frame in which this research takes place, including the proposed hypotheses. This chapter will outline the current state of research on cognitive styles, entrepreneurial passion and success. Furthermore, this chapter will cover the definitions and general concepts, entrepreneurship context, and finally the state of existing research on the interaction between cognitive styles and entrepreneurial passion. The third chapter is the methods section, which will explain the methodology that was used to conduct this study. Chapter four consists of the results found when testing the proposed hypotheses. In chapter five these results are discussed and a comparison is made with relevant existing theory. Chapter six mentions the limitations of this study and recommendations for future research. Chapter seven provides a conclusion of this study and chapter eight discusses acknowledgements. The penultimate chapter, nine, contains the references and chapter ten represents the appendix with relevant tables and figures.

## 2. Theory

### 2.1 Cognitive style

#### 2.1.1 Definition and concept of cognitive styles

The concept cognitive style has been given many different definitions since it was introduced by Klein and Schlesinger in 1951, however, these conceptions are overlapping rather than mutually exclusive. Overall, all definitions imply that “cognitive styles are consistent individual differences in ways of organizing and processing information and experience”. Additionally, contrary to cognitive strategies, cognitive style implies that they are spontaneously applied without conscious consideration or choice across a wide variety of situations (Messick, 1984, p. 61). Regarding the modifiability of cognitive styles, they appear to develop slowly and experientially and do not seem easily modifiable by specific tuition or training (Kagan & Kogan, 1970; Kogan, 1971). While researchers initially considered different cognitive styles as opposing ends of a continuum, more recently researchers have also provided evidence that individuals can rely both on intuitive and analytic information processing (Allinson & Hayes, 1996; Armstrong & Priola, 2001; Epstein et al., 1996). This view, dual processing theory, has gained more support from scholars and its empirical results prove its reliability and validity (Chaston & Sadler-Smith, 2012; Hodgkinson, Langan-Fox, & Sadler-Smith, 2008).

Furthermore, regarding the concept itself, researchers have distinguished various cognitive styles such as (1) adaptors and innovators (Michael Kirton, 1976), (2) analysts and wholists (RJ Riding & Buckle, 1990), (field dependence and field independence (Witkin & Goodenough, 1981), and (4) sequential and connective styles (Jabri, 1991). These different viewpoints reflect the complexity and multidimensionality of cognitive styles (Zelniker, 1989), although researchers argue that ultimately all constructs lead back to two fundamentally different ways of processing information (Messick, 1984; A. Miller, 1987). Another study by Riding & Cheema (2010) instead grouped cognitive styles into the wholist-analytic and verbalizer-imager dimensions (Richard Riding & Cheema, 1991).

#### 2.1.2 Cognitive style and entrepreneurship

The concept cognitive style is not limited to the psychology research field, since it has many applications and effects in other fields as well as it is seen as a critical intervening variable in work performance (MJ Kirton & De Ciantis, 1994). For example, in the field of industrial and organizational psychology, cognitive style is considered a fundamental factor determining both individual and organizational behavior and a critical variable in personnel selection, internal communications, career guidance, counseling, and conflict management (Hayes & Allinson, 1994; Sadler-Smith & Badger, 1998; Streufert & Nogami, 1989; Talbot, 1989). This implies that cognitive style affects decision-making, which is also supported by other studies (Epstein et al., 1996; Hough & Ogilvie, 2005; Sarasvathy, 2001). Furthermore, cognitive styles also significantly influence innovation performance, depending on the goal of an innovation team (Visser et al., 2014). Consequently, all these activities that are affected by cognitive style have a significant impact on firm successfulness. A study focused on SME's found that there is a positive relationship between the intuitive style and financial and non-financial performance. Moreover, a statistically significant relationship between the intuitive decision style and subsequent financial performance was observed (Sadler-Smith, 2004). Concluding, it is evident that cognitive style plays a significant role in entrepreneurship and organizational research and practice as a whole.

### 2.1.3 Intuitive style

Although researchers have not agreed upon a general term for individuals who process information in intuitive ways, this paper will use the term intuitive style since it has a solid foundation in previous research and it is a clear term that will directly give readers unambiguous information. This term represents the same concept as the experiential system proposed by Epstein.

Intuitive individuals are likely to discover opportunities by observing cues or signals through unfamiliar and unorganized information that is processed in a synthetic and holistic manner (Olson, 1985). This can help individuals identify an opportunity and motivate them to take action, as shown by the work of Miner (1997) who found intuition to be an important thinking mode of expert idea generators (Miner, 1997). Therefore, the intuitive cognitive style may be more effective than the analytic style in the searching stage (i.e., opportunity identification) of the new venture creation process (Kickul, Gundry, Barbosa, & Whitcanack, 2009). Intuitive individuals are also more inclined to be nonconformist and prefer a holistic problem-solving approach (Armstrong & Priola, 2001). Furthermore, intuitive leaders tend to be less dominating and more nurturing than analytic leaders, resulting in more respect and popularity (Allinson, Armstrong, & Hayes, 2001).

Rather than giving cognitive styles a specific name, Evans (2008) decided to use the neutral terms 'system 1' and 'system 2' and mapped various terms developed by other researchers that aim to catch the concept of dual-processing accounts of human behavior. An individual with an intuitive cognitive style is characterized by being experiential, automatic, associative, impulsive, heuristic and adaptive unconscious. Intuitive people tend to handle unconsciously, rapidly, with little effort and in a holistic manner (Evans, 2008). Please view table 1 on the next page for more detailed information about the attributes that are associated with the intuitive style.

### 2.1.4 Analytic style

With similar reasons as for the intuitive style, the term analytic style was chosen as the cognitive style to which Evans refers to as system 2. This term represents the same concept as the rational system defined by Epstein. Analytic individuals can be characterized as rational, systematic, conscious and rules-based. Analytic people tend to handle consciously, controlled and slowly in a reflective manner which requires high effort (Evans, 2008). Please view table 1 on the next page for more detailed information about the attributes that are associated with the analytic style.

Reber (1993) and Stanovich (1999) argued that there is a link between analytic processing and general intelligence (Reber, 1993; Stanovich, 1999). This proves that personal characteristics such as intelligence may be related to the utilization of a specific cognitive style, whether the decision is made consciously or not. Olson (1985) found that analytic individuals may display superior competency (compared to intuitive individuals) in evaluating information and selecting actions to implement this information, which are skills that are particularly needed in later stages of the new venture creation process. This superior information evaluation can be explained by the fact that analytic individuals rely on linear, sequential processing of information that enables them to consciously evaluate and plan for the new venture (Olson, 1985). This finding is supported by Armstrong and Priola (2001) who found that individuals with high levels of analytical information processing are inclined to be more obedient, favoring a logical, controlled, stepwise, and more systematic problem-solving method (Armstrong & Priola, 2001).

### 2.1.5 Model of Epstein et al. (1996)

This study follows the dual processing approach to cognitive styles based on the contributions of Epstein et al. (1996), who determined stable individual differences in ways of processing information. They provided a theoretical framework by which intuitive and analytic aspects of managerial (including entrepreneurial) cognition may be conceptualized and operationalized via self-reporting. This framework, cognitive-experiential self-theory (CEST), is a global theory of personality that categorizes how individuals process information via the experiential or rational system. This model reflects the dual process view on cognitive style, as the concepts intuitive and analytic are modelled as two separate unipolar scales. As a result, this model is more appropriate for this study than other models such as the Cognitive Style Index where the styles are modeled on a bipolar scale (Hodgkinson et al., 2008).

**Table 1.** Overview of attributes associated with both cognitive styles (intuitive and analytic style are referred to as experiential and rational system in this table) (Epstein, 1991)

<b>Experiential system</b>	<b>Rational system</b>
1. Holistic	1. Analytic
2. Automatic, effortless	2. Intentional, effortful
3. Affective: Pleasure-pain oriented (what feels good)	3. Logical: reason oriented
4. Associationistic connections	4. Logical connections
5. Behavior mediated by "vibes" from past events	5. Behavioral mediated by conscious appraisal of events
6. Encodes reality in concrete images, metaphors, and narratives	6. Encodes reality in abstract symbols, words, and numbers
7. More rapid processing: oriented toward immediate action	7. Slower processing: oriented toward delayed action
8. Slower and more resistant to change: Change with repetitive or intense experience	8. Changes more rapidly and easily: changes with strength of argument and new evidence
9. More crudely differentiated: Broad generalization gradient; stereotypical thinking	9. More highly differentiated
10. More crudely integrated: Dissociative, emotional complexes; context-specific processing	10. More highly integrated: Context-general principles
11. Experienced passively and preconsciously: we are seized by our emotions	11. Experienced actively and consciously: We are in control of our thoughts
12. Self-evidently valid: "Experiencing is believing"	12. Requires justification via logic and evidence

## 2.2 Entrepreneurial passion

### 2.2.1 Definition and concept of entrepreneurial passion

Studies on entrepreneurial passion all converge on three critical themes: (1) “the content of passion is an intense positive emotion (2) whose empirical referents or objects usually involve venture-related opportunities, tasks, or activities and (3) that has a motivational effect that stimulates entrepreneurs to overcome obstacles and remain engaged” (Cardon, Wincent, et al., 2009, p. 512). Subsequently, Cardon et al. (2009) defined entrepreneurial passion 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, Wincent, et al., 2009, p. 517). Following this definition, in a later study Cardon et al. (2009) determined three critical dimensions of entrepreneurial passion which will individually be discussed in the following sections after its effects on entrepreneurs ; (1) passion involves the experience of positive feelings, (2) these feelings are experienced for activities that are central to the self-identity of the individual, and (3) the feelings and identity centrality are focused on three specific entrepreneurial domains. Measuring these three dimensions will enable the measurement of entrepreneurial passion (Cardon, Gregoire, Stevens, & Patel, 2013).

### 2.2.2 Entrepreneurial passion and its effects on entrepreneurs

The significance of being passionate about entrepreneurship was already recognized by Schumpeter who argued that passion is responsible for entrepreneurial behavior that defy reason-based explanations, such as unconventional risk taking, uncommon intensity of focus and unwavering belief in a dream (Schumpeter, 1951). In line with this theory, Cardon et al. (2009) argues that entrepreneurial passion directly influences individual entrepreneurial behavior such as the commitment towards goals and nature of striving towards goal attainment (Cardon, Wincent, et al., 2009; Cardon, Zietsma, Saporito, Matherne, & Davis, 2005). However, an empirical study by Baum and Locke (2004) did not manage to find a direct relationship between entrepreneurial passion and venture performance (Baum & Locke, 2004; Baum, Locke, & Smith, 2001). On the other hand, empirical work of Murnieks et al. (2014) shows that entrepreneurial passion significantly affects entrepreneurial behavior, which supports Cardon et al.’s theory (Murnieks et al., 2014). Other scholars also argue that there is a positive relationship between passion and persistence, absorption and creative problem solving (Cardon, Wincent, et al., 2009; Chandler & Jansen, 1992; Csikszentmihalyi, 1990; Zhou & George, 2001). Overall, empirical research on this field is limited, however literature provides a solid foundation for the argumentation that entrepreneurial passion affects individual behavior.

### 2.2.3 Dimensions and domains of entrepreneurial passion

*The feeling of intense positive emotions:* The first dimension of entrepreneurial passion, the feeling of intense positive emotions, is central to the concept of passion in the fields of psychology, organizational behavior, and entrepreneurship (Baum & Locke, 2004; Chen et al., 2009; Liu, Chen, & Yao, 2011). In recent studies, Vallerand et al. (2003) and Cardon et al. (2009) view entrepreneurial passion as an affective phenomenon that one may experience when thinking about or engaging in certain activities (Cardon, Wincent, et al., 2009; Vallerand et al., 2003). Therefore, entrepreneurial passion consists of deeply experienced positive feelings for something important to the entrepreneur and, since this is an internal motivation, this feeling is more enduring than emotions caused by external stimuli (Wincent, Cardon, Singh, & Drnovsek, 2008). Additionally, individuals may reflect on the intensity of their feelings regarding different tasks and activities, since entrepreneurial passion is consciously accessible (Cardon, Wincent, et al., 2009).

*Identity centrality:* The second dimension of entrepreneurial passion refers to the fact that the previously discussed intense positive feelings are associated with roles that need to be meaningful and central to the self-identity of the individuals. Vallerand et al. (2003), Perttula (2004) and Cardon et al. (2009) all emphasize that intense positive feelings need to be accompanied by a deep identity connection to the object of those feelings, otherwise an individual cannot experience entrepreneurial passion (Cardon, Wincent, et al., 2009; Perttula, 2000; Vallerand et al., 2003).

*Domains of entrepreneurial passion:* The third dimension concerns the domains of entrepreneurial passion, or in other words, the object of entrepreneurial passion. This object towards which the positive feelings are aimed, could generally be viewed as the overall role of 'being an entrepreneur', however since this is a very broad concept Cardon et al. (2009) further specified this into three roles that are critical to the entrepreneurial process; (1) inventing new products or services, (2) founding new organizations, (3) developing these organizations beyond their initial survival and successes (Murnieks et al., 2014). Each of these roles involve a distinct set of tasks and activities which reflects the challenges that are associated with different aspects of the entrepreneurial process (Gundry & Welsch, 2001; Katila & Ahuja, 2002; Ronstadt, 1988). Entrepreneurs with a passion for inventing have strong desires to deliver new solutions to the marketplace involving activities such as scanning the environment for new opportunities, developing new products or services and working with new prototypes. On the other hand, entrepreneurs who have a passion for founding are very passionate about launching new businesses which involves assembling necessary financial, human, and social resources needed to create new ventures. Finally, entrepreneurs with a passion for developing enjoy developing already existing businesses, involving activities such as increasing sales, hiring of new employees, or finding investors willing to fund expansions. The level of entrepreneurial passion for each of the discussed domains may vary due to particular background or life experiences in different entrepreneurs, therefore this distinction in object of the entrepreneurial passion is necessary for measurement purposes (Cardon et al., 2013; Cardon, Wincent, et al., 2009).

### 2.3 Entrepreneurial success

The term entrepreneurial success represents the success of a venture, business activity or the success of the entrepreneur connected to the venture. Indicators of success can be related to business, economic, psychological and social aspects, such as financial information, the perception of an entrepreneur on their success or survival beyond a certain timeframe. Although one can attempt to measure success, one should always keep in mind this is merely a temporal observation since success can be transient in nature. Financial performance data enable one to objectively determine entrepreneurial success, however since success is a multidimensional construct it is best captured by including more than financial and economic indicators (R. A. Baron & Henry, 2011; Fisher et al., 2014). Measuring entrepreneurial success as perceived by entrepreneurs offers another method to measure entrepreneurial success which complements financial data or provides an alternative measurement method when financial data is unavailable. Given the fact that small and new ventures are unlikely to have adequate reliable financial statements, for example due to relatively higher monitoring and transaction costs, measurement of perceived success by entrepreneurs themselves could provide an alternative information source of entrepreneurial success (Fisher et al., 2014; Örtqvist, Masli, Rahman, & Selvarajah, 2006). Entrepreneurial success depends on individual perspective and even differs in genders, for example while men tend to use external standards to benchmark success such as gaining prestige or recognition for accomplishment, women tend to use internal definitions of success such as whether they accomplished what their original goals (Cliff, 1998; Rauch & Frese, 2000).

The success of new ventures depends on many factors, including the state of the economy, capital markets, actions and strategies adopted by competitors, changes in government policies and regulations that impinge the new venture or its products, and a host of other economic and technological conditions. Next to these external factors, other factors that influence success involve actions of the entrepreneur such as the decisions taken, strategies developed, leadership

style exercised, problem solutions implemented and the general behavior of the entrepreneur (R. A. Baron, 2004). As was established before, cognitive style and entrepreneurial passion play a significant role in these activities (Cardon, Wincent, et al., 2009; Hayes & Allinson, 1994; Hough & Ogilvie, 2005).

#### 2.4 Hypotheses formulation

Researchers argue that entrepreneurial passion directly has a significant effect on individual entrepreneurial behavior, while limited empirical evidence exists that support this claim (Baum & Locke, 2004; Cardon, Wincent, et al., 2009; Murnieks et al., 2014). On the other hand, numerous empirical studies have proven that cognitive styles have a significant effect on individual (entrepreneurial) behavior (Hayes & Allinson, 1994; Michael Kirton, 1980; MJ Kirton & De Ciantis, 1994). The fact that limited empirical evidence exists for a direct relationship between entrepreneurial passion and individual behavior is intriguing, given theoretical claims in the literature concerning the importance of passion. This could be an indication that cognitive styles are a mediator of entrepreneurial passion which subsequently affects individual behavior. Studies have found that cognitive styles interact with the external environment and can be modified in response to changing situational demands as well as be influenced by life experiences (Hayes & Allinson, 1994, 1998). Similarly, Cardon et al. (2009) argues that cognitive or behavioral change manifestations are outcomes of the experience of entrepreneurial passion. Research shows a positive relationship between entrepreneurial passion and creativity, supported by research on passion in employees which also shows a positive effect on creative problem solving (Cardon et al., 2013; Cardon, Wincent, et al., 2009; Zhou & George, 2001). Additionally, the existence of entrepreneurial passion in an entrepreneur is accompanied by the expression of strong emotions, which is more prominent in the intuitive cognitive style (Chen et al., 2009). Following this line of argument, Epstein argues that intuitive processing is increased when emotions are more involved and concludes that there is an intimate association between the intuitive system and emotions (Epstein, 1994). This gives the impression that the existence of entrepreneurial passion could lead to a more intuitive cognitive style.

On the other hand, there are also some arguments that support the opposite, namely that a higher level of entrepreneurial passion leads to a more analytical cognitive style. Particularly, Cardon et al. (2009) proposes that commitment to goals and the nature of striving towards goal attainment is reinforced by entrepreneurial passion (Cardon, Wincent, et al., 2009). In line with this, another study found that entrepreneurial passion works synergistically with logic and rationality to propel business growth (Winnen, 2006). This suggests that entrepreneurial passion may be related to the analytic cognitive style, since focus on goal attainment, logic and rationality are all critical aspects of this style. However, theoretical evidence supporting the fact that entrepreneurial passion leads to a more intuitive cognitive style is stronger and more convincing. Particularly, Cardon et al. (2009) argue that passion activates heuristic cognitive processing and coordinates the broaden-and-build mechanisms that are especially functional. As a result of a positive emotion such as entrepreneurial passion, individuals are more likely to have novel, varied and exploratory thoughts (Cardon, Wincent, et al., 2009).

Based on the discussed theoretical arguments the following hypothesis was developed:

*Hypothesis 1: The higher an individual's level of entrepreneurial passion is, the higher they will score on the usage of an intuitive cognitive style.*

Research shows that entrepreneurial passion can have positive influences on the business process. Cardon (2008) proposed a model that shows how entrepreneurs can transfer their

passion to employees in order to lead to positive effects such as increased creativity, persistence and ambition (Cardon, 2008). In line with this, the empirical results of a study by Breugst et al. (2012) show that a passion for inventing and developing enhances employee commitment, although it should be noted that a passion for founding reduces it (Breugst, Domurath, Patzelt, & Klaukien, 2012). Furthermore, entrepreneurial passion also influences funding potential, although preparedness was found to be even more important to investors (Cardon, Sudek, & Mitteness, 2009; Chen et al., 2009). Although Baum and Locke (2004) did not manage to find a direct relationship between entrepreneurial passion and venture performance, they did find that passionate entrepreneurs are more likely to invest resources like time and effort to develop needed capabilities for activities they like and goals they aspire towards. Cardon reinforces this by stating that passion may be a critical ingredient in an entrepreneur's success, not only because it mobilizes energy and enhances commitment, but also because passion drives entrepreneurs to reach goals and operate in a more functional manner (Cardon, Wincent, et al., 2009). Concluding, existing theoretical models from literature on entrepreneurial passion provide the expectation that one could expect entrepreneurial passion to have a positive impact on entrepreneurial success. Therefore, the following hypothesis was constructed:

*Hypothesis 2: Entrepreneurs experiencing high levels of entrepreneurial passion score higher on entrepreneurial success than entrepreneurs with lower levels of entrepreneurial passion.*

Multiple studies have identified cognitive styles as an important factor in business processes, including innovation, decision-making and organizational behavior. Individuals with the intuitive style are more confident in identifying and recognizing opportunities, while individuals with the analytic style are more confident in their ability to assess, evaluate, plan and marshal resources (Kickul et al., 2009). Overall, studies tend to find that the intuitive style has more positive outcomes than the analytic cognitive style in an entrepreneurship context. For example, the intuitive style is under many circumstances more effective in solving problems than the analytic style, even at simple levels (Epstein, 1994; Lewicki, Hill, & Czyzewska, 1992). Moreover, rational analysis can even interfere with the efficient functioning of the intuitive system, resulting in poorer judgements than when people rely on their unanalyzed, intuitive impressions (Wilson & Schooler, 1991). Furthermore, the intuitive style also has the capacity to operate at a higher level of complexity and individuals tend to find the intuitive system more compelling than processing in the mode of the analytic system (Epstein, 1994; Fisk & Schneider, 1983). Further specifying this preference for intuitive processing, entrepreneurs tend to be action-oriented and strongly prefer to make things happen instead of merely thinking about them, which is more in line with the intuitive system than the analytic style (Amit, MacCrimmon, Zietsma, & Oesch, 2001). These assumptions are supported by the results of an empirical study which showed that intuitive style has a positive relationship with financial and non-financial performance, suggesting that an intuitive style is associated positively with performance (Sadler-Smith, 2004). All in all, these findings suggest that the intuitive style may be superior for entrepreneurs, which poses the question whether intuitive entrepreneurs are indeed more successful than entrepreneurs that favour the analytic cognitive style. Based on these arguments, the following hypothesis was constructed:

*Hypothesis 3: Entrepreneurs that favor the intuitive style score higher on entrepreneurial success than entrepreneurs that favor the analytic style.*

Considering the fact that cognitive style and entrepreneurial passion are both found to have a relationship with success and the theorized interaction between passion and cognitive style, one

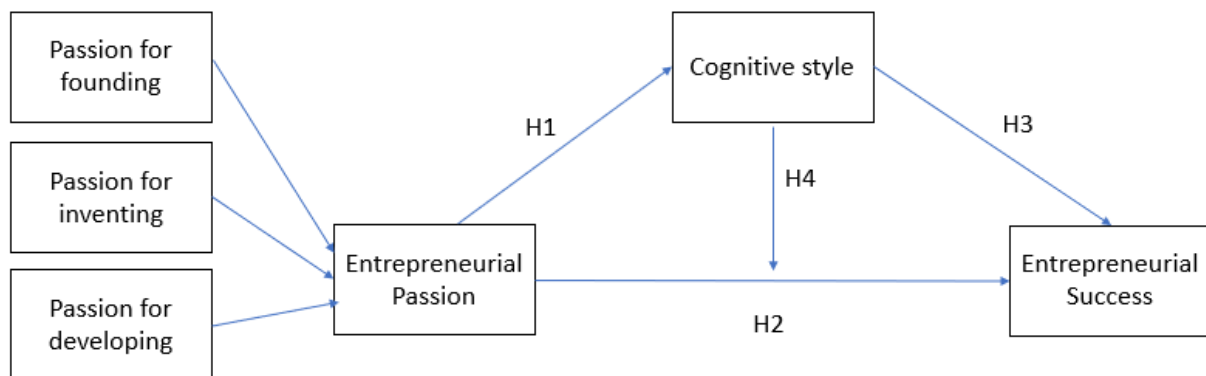
should not neglect the potential moderating effect cognitive style could have on H2. In order to check for this effect the following hypothesis was created:

*Hypothesis 4: Cognitive style acts as a moderator for the relationship between entrepreneurial passion and entrepreneurial success.*

## 2.5 Conceptual model

Based on the discussed theory and proposed hypotheses, the following conceptual model was constructed. Specifically, the paper of Cardon et al. (2013) provided the foundation on which this model was built.

**Figure 2.** Conceptual model of the variables entrepreneurial passion, cognitive style and entrepreneurial success. Arrows represent expected relationships based on existing theoretical literature.



## 3. Methods

Since the main goal of the study is to find out to what extent entrepreneurial passion influences cognitive style and how these concepts affect the successfulness of an entrepreneur, these variables are the main component of the data collection, complemented by firm performance data and data of controlling variables. As the aim is to find relationships between variables in the sample in order to then generalize them to answer the hypotheses, an explorative quantitative survey-based study was conducted.

### 3.1 Data collection

#### 3.1.1 Sample

The unit of analysis of this study is the entrepreneur. Additionally, this study controls for the experience of an entrepreneur in order to avoid potential bias from experienced entrepreneurs since expertise plays a key role in venture success. Therefore the main aim of the data collection process was to collect data from novice entrepreneurs (less than or equal to five years of experience) (Dew et al., 2009). Novice entrepreneurs often deal with increased difficulties (uncertainty, limited resources, inexperience) which makes factors (e.g. cognitive style and entrepreneurial passion) influencing decision making and behavior even more important (Grégoire et al., 2011).

This study aims to accurately portray the experience of an entrepreneur's passion and cognitive style, instead of the perception of these concepts. To test the developed hypotheses, tacit and deep lying knowledge needs to be accessed such as the cognitive style and level of entrepreneurial passion within an entrepreneur. Additionally, new ventures often do not have

financial performance information available publicly. Since this data is unavailable without participation of entrepreneurs in this study, data will only be collected from entrepreneurs that will give the opportunity to do so. Entrepreneurs were approached via local (university) institutions and a range of different entrepreneurial events. Online surveys based on the measures discussed in the next part were distributed to entrepreneurs willing to participate. The targeted sample size was 100 respondents since this allows for a small margin as the minimum required sample size is 84 given the fact that there are three variables (intuitive cognitive style, analytic cognitive style and entrepreneurial passion) that function as independent variables in one or more of the proposed hypotheses. Considering that this study does a multiple regression and correlation analysis a sample size of 84 would be the minimum with an alpha level of 0.05 and population effect size of medium (Cohen, 1992). The final collected sample has a sample size of 156, however after correction of a double entry, 155 legitimate responses remained. The sample consists of 32.3% female entrepreneurs and 67.7% male entrepreneurs, which is in line with average entrepreneur demographics (Fairlie, 2016). Novice entrepreneurs form the dominant group of this sample with a count of 109 (70.2%) while expert entrepreneurs have a frequency of 46 (29.7%). Considering the fact that the goal of this study was to mainly collect data of novice entrepreneurs due to potential influences on the variables involved in this study, it is important to note that even removing expert entrepreneurs from this sample would still leave a sample size of 109, which is considered satisfactory for this research.

### 3.1.2 The geographical area of research: USA

While this study could be conducted anywhere in the world as long as there is a sizeable amount of new ventures, the USA was chosen as the geographical region in which this study takes place. The USA is generally seen as the cradle of capitalism and emphasizes entrepreneurship which is seen as a cornerstone of the society. The USA ranks first and third in entrepreneurship ranking studies and second in global competitiveness, reflecting its openness to founding of new businesses (GEDI, 2018; USNews, 2018; WorldEconomicForum, 2018). This makes it an attractive country for new ventures and novice entrepreneurs, which means it is an appropriate and interesting location to conduct this study in. In order to prevent potential bias from collecting data from only one specific part of the USA, several different states were visited including (but not limited to) California, Georgia, Tennessee, Mississippi, New York and District of Columbia. Data was collected from residents of larger cities as well as smaller cities. Since the entrepreneurs encountered in these states also frequently were living and operating in other states, the sample is relatively diverse which allows it to be representative for the USA as a whole.

### 3.1.3 Measures

In order to test the proposed hypotheses, an online survey was developed based on the validated models of Epstein et al. (1996), Cardon et al. (2013) and Fisher et al. (2014). The model of Epstein et al. (1996) was chosen since this is a relatively new measure that is considered to be one of the best available general measures of individual differences in intuitive and analytical processing (Chaston & Sadler-Smith, 2012; Hodgkinson et al., 2008). The model is representative of dual-process theories and has demonstrated good reliability and validity. This model, the Rational-Experiential Inventory (REI), consists of 31 items on two unipolar scales: "Faith in intuition" which measures the intuitive *cognitive style* and "Need for cognition" which measures the analytical style. Based on factor loadings another 10-item version was developed and found that they are strongly related to the original item set, providing evidence that this item set is appropriate to use. In order to keep the survey as compact as possible, this study used the validated 10-item REI which can be found in appendix A, figure 1. Items were rated on a 5-point scale, from completely false to completely true (Epstein et al., 1996).

The second main variable, *entrepreneurial passion*, was measured with the scale developed by Cardon et al. (2013), since Cardon is one of the leading researchers in the field of entrepreneurial passion and developed this model based on numerous studies on this subject. Initially, this study selected 18 items for feelings of passion and 4 for identity centrality, however after some testing the authors ultimately validated 13 items total for both entrepreneurial passion dimensions, intense positive feelings and identity centrality across the domains of inventing, founding, and developing. The items of the proposed model to measure entrepreneurial passion can be found in appendix A, figure 2. A 7-item Likert scale was adopted since this was recommended by Cardon et al. (2013) in order to widen the possible input for respondents.

In order to measure the final main variable, *entrepreneurial success*, this study collected generic data such as the *number of employees*, *turnover* and *net income* in line with other studies (Brush & Vanderwerf, 1992). However, since new ventures are unlikely to have public information available or tend to be unwilling to disclose performance information, a measurement model that replaces these types of data was needed. Fisher et al. (2014) developed such a model, which focusses on the entrepreneurs' feelings of satisfaction and personal expectations for their life and business, combined with continuous business growth and exceeding business goals. The original developed model consisted of nine questions that form the construct of entrepreneurial success, however after empirical testing they found that only four items were statistically relevant after considering factor loadings and significance. In line with this study, success was measured based on these four items on a five-point Likert scale, since other information such as net income or turnover was often lacking or unreliable. Please view figure 3 in appendix A for more details on the questions that were used (Fisher et al., 2014).

#### 3.1.4 Control Variables

Next to the discussed variables that will be measured through validated surveys, this study also collected data on control variables that have been identified by the research models of both Epstein (1996) and Cardon et al. (2013). Epstein discovered that men scored higher on average on the NFC scale than women, therefore this collected data for *gender*. Similarly to Cardon et al. (2013), data of *education background*, *age of the entrepreneur*, *industry type*, and *number of employees* was collected. As previously stated, data of the *experience of entrepreneurs* was collected due to the role of expertise in success (Dew et al., 2009). In addition to these variables, data was collected of various general variables that could potentially play a role in one or more of the constructed hypotheses; *official registration of the venture*, *number of founded ventures*, and finally *primary objective of the venture*.

#### 3.2 Data analysis

In order to test the proposed hypotheses, an appropriate measurement technique needed to be selected and assumptions needed to be checked. Although treating Likert scale items as metric variables has been questioned in the past, recently researchers have provided strong arguments demonstrating that this is appropriate (Norman, 2010; Sullivan & Artino Jr, 2013). In line with these authors, scale variables were created based on Likert items. Therefore, utilising multiple regression would be an appropriate statistical dependence technique to test the hypotheses, given the fact that there are (at least) two metric variables in all hypotheses. Before proceeding to a multiple regression analysis, four important assumptions were checked for all variables; linearity, reliability of measurement, homoscedasticity and normality (Osborne & Waters, 2002). Standardized beta coefficients will be used since the items that measured entrepreneurial passion, cognitive style and entrepreneurial success used different scales.

### 3.2.1 Cognitive style

Since this study adopts the dual-process theory of Epstein, two separate variables were created for intuitive and analytic style, each based on 5 REI questions. Questions 1, 2 and 5 of REI were reversed since 1 and 2 were mentioned as reverse questions and 5 is likely an oversight by the author when considering the context. An exploratory factor analysis was executed with principal axis factoring and 2 factors were found with an eigen value above 1 (Appendix C, table 1), which is in line with the theory. An acceptable KMO of 0.798 was found and Bartlett's test was rejected which means factor analysis is appropriate. Principal axis factoring was chosen since the primary concern is to identify the underlying dimensions as cognitive style was measured indirectly this way. The 5 questions that are supposed to compose the variable for the analytical style (need for cognition, figure 8 in appendix A) are all significantly correlated with each other except for question 5. Factor loadings are in line with this, since the loading of all questions is at least 0.48 except question 5 with 0.29. With a sample size of 155 significant loadings should be higher than 0.45 which is not satisfied by question 5 (Hair Jr, Black, Babin, Anderson, & Tatham, 2010). Reliability analysis shows that the reliability could be improved from a Cronbach's Alpha of 0.624 to 0.679 by removing the fifth question. However, considering the fact that this variable has previously been tested and deemed a valid way to measure the analytic style, this study has kept the variable composition exactly the same as Epstein et al. (1996). The same analysis was done for the intuitive style variable (faith in intuition, figure 8 in appendix A) and it showed that all 5 questions were significantly correlated and the new combined variable has a Cronbach's Alpha of 0.848. Factor loadings are all sufficient with a score of 0.58 or higher, please view appendix C for more information on factor loadings. Loadings were rotated with the varimax procedure, since factors are uncorrelated. Considering this factor analysis, it is appropriate to have two scale variables that measures cognitive style; one for the analytical style (need for cognition) and one for the intuitive style (faith in intuition).

Firstly, normality was tested for both variables with a QQ-plot, histogram and descriptive statistics, of which the first two can be found in figure 1 and 2 in appendix D. The analytical style has a skewness of -1.019 and kurtosis of 1.485. The histogram and Q-Q Plot reveal a relatively normal shape although it is slightly skewed to the left. Both normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) show a significant result (0.00 and 0.00) which means it is not perfectly normal, however considering the other figures, descriptive statistics, and the fact that parametric statistics can still be used with Likert scale data with non-normal distributions, it is deemed acceptable to continue (Norman, 2010). The intuitive style has a skewness of -0.910 and kurtosis of 2.389. The histogram and Q-Q plot (Appendix D, figure 3 and 4) show relatively similar results to the analytical style with a slight skew to the left. Normality test results are also significant here, however the same conclusion was made for the intuitive style as for the analytical style and therefore it is acceptable to continue further analysis. Several outliers were found in both variables, however considering the theory there is no reason to conclude this is bad data and it could just be due to random variation, therefore no data is removed from the dataset. Since the cognitive style variables function as a dependent variable in the first hypothesis and an independent variable in the third, homoscedasticity and linearity was tested in both forms separately and requirements were satisfied (Appendix D, figure 5, 6, 7, 8).



### 3.2.2 Entrepreneurial passion

Firstly, an exploratory factor analysis with principal axis factoring was conducted to reveal the underlying dimensions involved with the entrepreneurial passion questions. Bartlett's test was rejected and a KMO of 0.884 was found which confirms a factor analysis is appropriate. The factor analysis found three dimensions (Appendix C, table 3) which is in line with the theory and tested model of Cardon et al. (2013), although it should be noted that one dominant factor explains substantially more variance than the other two factors combined. Significant correlations were found between the three dimensions (0.49, 0.55, 0.71,  $p < 0.01$ ). Considering the correlation between factors, oblique rotation was used to examine factor loadings. The pattern and structure matrix (Appendix C, table 4 and 5) both show high loadings and several cross loadings. Multicollinearity could cause problems during the regression analysis, however aggregation of these latent variables could help prevent these issues (Kock & Lynn, 2012). Therefore, considering the significant correlations, cross loadings and factor analysis, all three passion domains are averaged into one variable that represents entrepreneurial passion as a whole. A Cronbach's Alpha of 0.898 was found with the reliability analysis of entrepreneurial passion as a whole which confirms the appropriateness of the combined variable.

Although normality tests failed (0.000 Kolmogorov-Smirnov and 0.000 Shapiro-Wilk), a slight normal shape that is skewed to the left can be recognised in the histogram and Q-Q plot (Appendix D, figure 9 and 10). Since parametric statistics can be used with Likert scales without normal distributions this is deemed acceptable (Norman, 2010). Descriptive statistics show a skewness of -0.960 and kurtosis of 0.576. Some outliers were found but none were removed since they are plausible when considering the theory behind this variable and could just be random variance among the tested entrepreneurs. Homoscedasticity and linearity were tested for both hypotheses with entrepreneurial passion as the independent variable, with the cognitive style as dependent variable in one model and success as dependent variable in the other. Conditions were satisfied and further analysis with multiple regression is therefore appropriate.

### 3.2.3 Entrepreneurial success

Results of inter-item correlation show that all measurement questions are significantly correlated except for question two and four. Results of the principal axis factoring analysis (Appendix C, table 7) proved that there is, as expected, only one factor measured by the four questions measuring entrepreneurial success. A KMO of 0.666 was found and Bartlett's test was successfully rejected. Factor loadings (Appendix C, table 8) are high except for question two which exhibits a loading of 0.352. which is still acceptable given the fact that this measurement method has previously been proven. A reliability analysis showed a Cronbach's Alpha of 0.643. Concluding, this variable was deemed acceptable for further analysis which is in line with Fisher et al (2014) who proved that this is a reliable and valid measurement scale.

While normality tests both show significant results for this variable being non-normal, the histogram and Q-Q plot show a slight normal shape with a skew to the left. The skewness is -0.491 and kurtosis 0.100. A few outliers were found but were not removed since the data could just be random variance among the entrepreneurs. There is no reason to believe these cases are an example of erroneous entrances by respondents. Concerning homoscedasticity and linearity, this variable has already been tested in its relationships with the previously discussed variables and conditions were satisfied.

### 3.2.4 Control variables and interaction variables

Control variables were converted into metric variables when possible and appropriate in order to be able to test them with a regression analysis. Gender was made appropriate for a regression analysis by coding female as 1 and male as 2. Categorical variables such as gender, state of residence, education background and industry type were checked through frequency tables to verify the diversity of the sample, since the size of these groups is too small to perform comparisons between them. The frequency tables can be found in table 1 and 2 in appendix B. In order to be able to test hypothesis 4, two interaction variables were created by multiplying standardized values of both cognitive styles with entrepreneurial passion.

## 4. Results

### 4.1 Descriptive statistics

In table 3 correlations between metric variables of this sample can be observed. Firstly, both cognitive styles show a significant positive correlation with all variables measuring entrepreneurial passion, except for passion for founding. Solely the intuitive cognitive style has a significant correlation with education level, which is negative ( $r=.16$ ,  $p<.05$ ). Concerning entrepreneurial passion, significant positive correlations can be observed between all three passion dimensions and entrepreneurial passion as a whole. The table also displays a significant positive correlation between a passion for inventing and a higher score on gender, which leans more towards male entrepreneurs ( $r=.21$ ,  $p<.01$ ).

While it can be observed that entrepreneurial passion has a significantly positive correlation with the number of ventures an entrepreneur has founded ( $r=.22$ ,  $p<.01$ ), it should be noted that this correlation is not significant with a passion for developing ( $r=.012$ ,  $p>.05$ ) whereas it is significant with a passion for inventing ( $r=.26$ ,  $p<.01$ ) and founding ( $r=.18$ ,  $p<.05$ ). Furthermore, a significant and positive correlation between all entrepreneurial passion variables and experience was found. Regarding entrepreneurial success, the table displays that it is significantly and positively correlated with all entrepreneurial passion variables and the intuitive cognitive style.

Also, a significant and positive correlation can be observed between entrepreneurial success and the number of ventures that have been founded by an entrepreneur ( $r=.17$ ,  $p<.05$ ) and number of employees of the venture(s) ( $r=.20$ ,  $p<.05$ ). Several significant correlations were found between control variables such as the age of an entrepreneur and their level of education, number of founded ventures and their entrepreneurial experience. Gender (1=female, 2=male) also displays a significant and positive correlation with number of founded ventures ( $r=.20$ ,  $p<.05$ ), entrepreneurial experience ( $r=.17$ ,  $p<.05$ ) and number of employees ( $r=.30$ ,  $p<.01$ ), which implicates that male entrepreneurs tend to have higher values in these categories. Lastly, as expected, positive and significant correlations were found between the number of ventures an entrepreneur has founded, their experience and number of employees.

**Table 3. Correlations of all metric variables**

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1 Analytic-rational style												
2 Intuitive-experiential style	-0,044											
3 Passion for inventing	,353**	,217**										
4 Passion for founding	0,078	0,134	,493**									
5 Passion for developing	,233**	,189*	,545**	,708**								
6 Entrepreneurial passion overall	,258**	,211**	,792**	,867**	,889**							
7 Entrepreneurial success	0,148	,321**	,353**	,304**	,420**	,422**						
8 CV1Age	0,115	-0,072	0,105	0,039	0,043	0,072	-0,031					
9 CV2Gender	0,083	-0,006	,209**	0,082	0,044	0,129	0,019	0,077				
10 CV3Education level	0,118	-,162*	-0,122	-0,144	-0,005	-0,105	-0,068	,430**	0,035			
11 CV4Number of founded ventures	0,155	-0,013	,255**	,175*	0,123	,215**	,170*	,284**	,203*	-0,040		
12 CV5Entrepreneurial experience	0,111	0,045	,205*	,214**	,164*	,228**	0,116	,674**	,166*	0,051	,646**	
13 CV6Number of employees	0,053	0,079	0,124	0,094	0,128	0,135	,201*	0,125	,296**	0,101	,317**	,333**

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

4.2 Hypothesis 1: *The higher an individual's level of entrepreneurial passion is, the higher they will score on the usage of an intuitive cognitive style.*

**Table 4.** Results of multivariate regression analysis H1 (dependent variable=intuitive style, N=155)

Model	Variable	Standardized coefficients beta
1: Control variables	Age	-0,107
	Gender	-0,024
	Education level	-0,139
	Number of founded ventures	-0,13
	Entrepreneurial experience	0,181
	Number of employees	0,094
2: Independent variables	Entrepreneurial passion	0,216*
	Analytical-rational style	-0,071

\*\* . Coefficient is significant at the 0.01 level (2-tailed).

\*. Coefficient is significant at the 0.05 level (2-tailed).

The model above (table 4) shows that no control variables were found to have a significant effect on the level of intuitive style utilization of entrepreneurs. VIF levels are all within reasonable ranges. While the VIF score of entrepreneurial experience is substantially higher than other variables (due to a moderately strong correlation with age and number of ventures founded), there is no reason for concern since the value is still only 3.75 (Alin, 2010). In line with H1, results show that intuitive cognitive style has a significant positive relationship with entrepreneurial passion (standardized B=0.216, t=2.532, p=0.012). Since literature specifically stated potential modifying effects of entrepreneurial experience and gender, additional robustness checks were done by performing the same analysis with only novice entrepreneurs (N=109) and another analysis with only male entrepreneurs (N=105). Results remained similar with entrepreneurial passion as the only significant variable and therefore there is evidence to believe that an individual's level of entrepreneurial passion positively affects their usage of the intuitive style. However, it should be noted that r square only has a value of 0.084 (0.04 adjusted r square) which means there is a rather small effect size. As previously stated in the theory, cognitive styles are a complex phenomenon with many other influencing factors. While entrepreneurial passion may not be a strong predictor of the intuitive style, this model proves that there is a small but reliable relationship between both variables.

Furthermore, since some authors (Cardon et al. 2009, Winnen 2006) also argued for a link between entrepreneurial passion and the analytical style, this relationship was also analyzed with a regression model. Interestingly, another significant positive relationship was found between entrepreneurial passion and the analytical cognitive style (standardized B=0.254, t=3.120, p=0.002). This shows that while H1 can be accepted, entrepreneurial passion also positively affects the usage of the analytical style. Further statistical information can be found in table 35 in the appendix.

4.3 Hypothesis 2: *Entrepreneurs experiencing high levels of entrepreneurial passion score higher on entrepreneurial success than entrepreneurs with lower levels of entrepreneurial passion.*

**Table 5.** Results of multivariate regression analysis H2, H3 & H4 (dependent variable=entrepreneurial success, N=155)

Model	Variable	Standardized coefficients beta
1 Control Variables	Age	-0,119
	Gender	-0,058
	Education level	-0,032
	Number of founded ventures	0,107
	Entrepreneurial experience	0,079
	Number of employees	0,176
2 Independent variables	Entrepreneurial passion	0,339**
	Intuitive-experiential style	0,242**
	Analytic-rational style	0,063
3 Moderating effects	Interaction analyticpassion	0,027
	Interaction intuitivepassion	0,000

\*\* . Coefficient is significant at the 0.01 level (2-tailed).

\*. Coefficient is significant at the 0.05 level (2-tailed).

Results of these models (table 5) show that no control variables have a significant relationship with entrepreneurial success. The proposed hypothesis is supported by the data in model 2, since success has a significant positive relationship with passion (standardized B=0.339,  $t=4.349$ ,  $p=0.000$ ). VIF values are similar to the previous model and are within acceptable ranges. The  $r$  square of 0.272 (adjusted  $r$  square 0.227) shows that, especially compared to the findings of hypothesis one, the effect size of entrepreneurial passion on entrepreneurial success is substantially larger. Performing the same regression analysis with only novice entrepreneurs (N=109) and with only male entrepreneurs (N=105) results in similar findings with entrepreneurial passion as the only significant relationship in model 2. Therefore, this hypothesis can be accepted as these results indicate that entrepreneurs who score higher on entrepreneurial passion are likely to score higher on entrepreneurial success.

#### 4.4 Hypothesis 3: *Entrepreneurs that favor the intuitive style score higher on entrepreneurial success than entrepreneurs that favor the analytic style.*

The regression analysis (table 5) shows that the intuitive style has a significant positive relationship with success (standardized B=0.242,  $t=3.259$ ,  $p=0.001$ ) whereas the analytical style has a smaller standardized beta value and is not significant (standardized B=0.063,  $t=0.844$ ,  $p=0.400$ ). Similar results were found when filtering the sample and conducting the same regression analysis with only novice entrepreneurs (N=109) and with only male entrepreneurs (N=105). Therefore, the results support the hypothesis that entrepreneurs that favor the intuitive style score significantly higher on success than entrepreneurs that favor the analytical style.

Given the fact that there is a direct relationship between passion and success, passion and intuitive style, and the intuitive style and success, a mediator effect should be considered. Model 2 shows that the relationship between passion and success remains significant when introducing the intuitive style, however the strength of the relationship between passion and success has decreased from a standardized beta of 0.355 to 0.339. Therefore, these results indicate that there may be a partial mediation effect by the intuitive style. Mediation significance tests yield inconsistent results with Sobel's test and Aroian's test showing insignificant results ( $p=0.053$

and  $p=0.06$ ), while Goodman's test gives a significant result ( $p=0.046$ ) with an alpha of 0.05. However, since Sobel's test and Aroian's test are found to be more accurate, it can be concluded based on the results of these tests that no significant partial mediation effect is present in this sample (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; MacKinnon, Warsi, & Dwyer, 1995).

#### 4.5 Hypothesis 4: *Cognitive style acts as a moderator for the relationship between entrepreneurial passion and entrepreneurial success.*

The results (table 5, model 3) suggest that this hypothesis can be rejected, since the interaction variables of passion and analytical style and passion and intuitive style show a very low beta value and significance with  $B=0.027$ ,  $p=0.739$  and  $B=0.000$ ,  $p=0.996$ . Therefore, it can be concluded that no significant moderators were found within this study, however a direct positive relationship was observed between entrepreneurial passion and entrepreneurial success.

## 5. Discussion

Whereas prior research on cognitive styles and entrepreneurial passion mostly focused on both concepts separately and merely developed theoretical propositions regarding the interaction of these two variables, this study empirically tested to what extent entrepreneurial passion influences the usage of cognitive styles and how both entrepreneurial passion and cognitive styles play a role in the success of an entrepreneur. Given the degree of complexity of underlying psychological dimensions of entrepreneurship, this study reveals valuable new insight into the interconnectedness of entrepreneurial passion and cognitive styles and therefore aids in mapping the complex inner workings of entrepreneurship.

Before elaborating on the results of this study, two control variables deserve further discussion. While research by Dew et al. (2009) emphasized the influential role of expertise in entrepreneurial success and research by Epstein et al. (1996) stressed the role of gender in cognitive styles, this study did not find these control variables to be of significant effect on the main variables. Gender may not be of influence due to simple random variation as this sample is smaller than the sample used by Epstein et al. (1996). While the same may apply to expertise, difference in measurement of entrepreneurial expertise may also play a role. While this research measured expertise through experience of entrepreneurs, other studies used different and/or more elaborate forms of measurement (Mitchell & Chesteen, 1995; Sarasvathy, Dew, Read, & Wiltbank, 2008). However, additional robustness checks show that results hold even when filtered according to these two variables.

Existing studies have implicated that entrepreneurial passion affects the intuitive as well as the analytical cognitive style. One side argues that the existence of entrepreneurial passion is accompanied by the expression of strong emotions and that intuitive processing is increased when these emotions are present (Chen et al., 2009; Epstein, 1994). Further strengthening these claims, passion activates heuristic cognitive processing and results in more novel and exploratory thoughts, which reflects the intuitive cognitive style (Cardon, Wincent, et al., 2009). On the other hand entrepreneurial passion ignites a propensity to strive towards goal attainment and works synergistically with logic and rationality to aid an entrepreneur in growing their business, which resembles the analytical cognitive style (Cardon, Wincent, et al., 2009; Winnen, 2006). While existing studies lack empirical data to substantiate their claims, this study managed to find significant results in regards to the relationship between entrepreneurial passion and cognitive style. The results of this study show that both claims are

justified with a significant positive relationship between entrepreneurial passion and both styles. Although no style of preference was found for passionate entrepreneurs, these results could potentially indicate that passionate entrepreneurs are more likely to spend more time on their decision making and thinking process. Passionate entrepreneurs therefore may be more willing to contemplate different options, both from analyzing available information in an analytical and intuitive manner. This would resonate with literature on passion which states that entrepreneurial passion directly influences commitment and intensity of focus (Cardon, Wincent, et al., 2009; Schumpeter, 1951). Further exploring entrepreneurial passion, correlation results exhibit that male entrepreneurs tend to have a higher passion for inventing than female entrepreneurs. This is in line with research on gender specific preferences in regards to their interest and competence (Hazari, Sonnert, Sadler, & Shanahan, 2010). Given the fact that male entrepreneurs tend to have a higher passion for inventing and results of this study showing that passion as a whole has a positive significant correlation with success, male entrepreneurs may be superior on average compared to their female colleagues in highly innovative industries which require many new inventions to sustain. Additionally, whereas a passion for inventing and founding has a significantly positive correlation with the number of ventures founded, a passion for developing has a weaker correlation, as is expected, which is not significant. Simultaneously a passion for developing shows a stronger correlation with success than the other 2 passion dimensions. This confirms theoretical assertions since this illustrates the fact that entrepreneurs with a passion for developing tend to focus more on a smaller amount of projects and aim to bring these to a higher level, whereas entrepreneurs with a passion for inventing and founding prefer to work on several different projects at the same time or sequentially (Cardon et al., 2013; Cardon, Wincent, et al., 2009). This means that entrepreneurs with a passion for developing may be more suited to operating in mature industries, since this allows them to continuously enhance their venture in a less turbulent environment.

Works by Breugst et al. (2012), Cardon (2008) and Cardon et al. (2009) claim that entrepreneurial passion would have a positive effect on a venture and its success. However, an empirical study relevant to this topic did not find any significant results when zooming in on the effect of passion on venture success (Baum & Locke, 2004). In line with theoretical claims, empirical results of this study show that success has a significant positive relationship with the level of entrepreneurial passion in an entrepreneur. Further specifying this relationship, it can be concluded based on this study that the enhanced commitment and drive (which is enabled by entrepreneurial passion) allow an entrepreneur to become more successful than other entrepreneurs with lower levels of entrepreneurial passion. Therefore, it is important for entrepreneurs to sell products or services they are passionate about as this might give them an advantage compared to other entrepreneurs who lack entrepreneurial passion. Following the description of Cardon et al., this means entrepreneurs would operate in a field to which they have intense positive emotions which are meaningful and central to the identity of the entrepreneur. An entrepreneur that possesses passion for their venture will have more drive and commitment towards making it a successful venture, which could also positively affect employees in regards to their creativity, persistence and ambition (Cardon, 2008).

Previous studies have indicated that the intuitive style may be superior to the analytical style in an entrepreneurship context. With its advantages in creative problem solving, greater capacity to operate at a higher complexity and action oriented decision making, the intuitive style is associated positively with performance (Amit et al., 2001; Epstein, 1994; Sadler-Smith, 2004). Results of this study confirm these claims and findings since a strong and significant positive relationship was found between the intuitive style and entrepreneurial success. On the other hand, the relationship with the analytical style and success is substantially weaker and far from

significant. Therefore, these findings show that the intuitive style is favorable for entrepreneurs if they desire to become successful. While the analytical style may be advantageous in other specific circumstances, for entrepreneurs it may be beneficial to allow their intuition to become more dominant when contemplating options and processing information. Further zooming into cognitive styles, results show that there is no significant negative relationship between the intuitive and analytical style. This suggests that the usage of one specific cognitive style does not necessarily reduce the usage of the other cognitive style. While some researchers choose to measure the cognitive style on a bipolar scale such as Hodgkinson et al. (2008), these results show that it would be more appropriate to follow the model proposed by Epstein et al. (1996) since there is no significant reverse relationship. This measurement model allows both cognitive styles to be measured separately with two unipolar scales.

Furthermore, it is interesting to note that this study found a significant negative correlation of the intuitive style with level of education while simultaneously no significant correlation was found between education level and entrepreneurial success. Therefore, these findings indicate that the level of education may not play an important role in achieving entrepreneurial success. A higher education level may even have a limiting effect since higher educated entrepreneurs tend to use the intuitive style less which has been found to be better at achieving entrepreneurial success. In other words, while one could argue that a larger set of knowledge and skills, which comes with education, allows entrepreneurs to make better decisions and become more successful, at the same time this higher level of education reduces the usage of the intuitive style, which counters the positive effects of having a larger skill and knowledge set.

The control variables that measure the amount of ventures that an entrepreneur has founded and the amount of employees they employ show a significant and positive correlation with success. Naturally, having multiple ventures and larger ventures allows for greater opportunities to reach a higher level of success although management of these ventures also comes with associated risks.

Although no moderating effect was found in this study, several significant direct effects were found which may enhance entrepreneurship knowledge by providing new insights in the complexity and interaction between entrepreneurial passion, cognitive styles and entrepreneurial success. Altogether, the theoretical contribution of this study to the literature is threefold. By finding new empirically tested results showing that entrepreneurial passion influences cognitive styles, this research provides a valuable contribution to academic research on both entrepreneurial passion and cognitive styles. Future research should not neglect this significant relationship as this may affect their results. Secondly, this study provides new empirical results supporting prior theoretical beliefs that entrepreneurial passion has a positive effect on entrepreneurial success, thereby contributing to the understanding of drivers of entrepreneurial success. Finally, this study provides evidence that the intuitive cognitive style is positively associated with entrepreneurial success, which further contributes to the understanding of drivers of entrepreneurial success.

In practice, entrepreneurs who aim to use the findings of this study should attempt to rely more on their intuition when processing information and making decisions. This is in line with a study by Sadler-Smith (2004) which also demonstrates a positive relationship between the intuitive style and both financial and non-financial performance. While it cannot be concluded based on this study that this may lead to greater financial success since no financial data was used, entrepreneurial success as a whole is significantly increased when entrepreneurs tend to use their intuitive cognitive style more. Since success is a large multidimensional construct including personal level variables, this positive effect could be due to the more emotional, passionate and personal approach of the intuitive cognitive style compared to the analytical



style. This could give entrepreneurs more satisfaction and therefore improve the perceived success as they manage to live and operate their business in a compelling manner that delivers a sense of enjoyment and pride. This combined with doing business in an area that an entrepreneur is passionate about allows an entrepreneur to have the highest chance of becoming more successful. Similarly to the intuitive cognitive style, operating your business in a field an entrepreneur is passionate about, can align their own values with and can identify themselves with will provide additional feelings of fulfilment and achievement, culminating in superior perceived entrepreneurial success. Therefore, incubators, accelerators and institutions that develop policies for entrepreneurs should encourage and aid entrepreneurs to find a profession they are passionate towards and stimulate the usage of their intuitive cognitive mode. Furthermore, findings of this study could aid investors in selection procedures if their goal is to invest in successful entrepreneurs, since the results of this study show that more passionate entrepreneurs who favour the intuitive style are more likely to become more successful.

## 6. Limitations and future recommendations

While this study aims to provide unbiased reliable results, several limitations should be considered. Firstly, all data that was gathered, except for a few control variables, is based on subjective perceptions. While objective measures for entrepreneurial passion and cognitive style may be non-existent, future studies could apply more objective measures for success of the entrepreneur and venture (e.g. financial venture performance). Further scrutinizing measurement methods, the expertise of entrepreneurs was measured solely with their years of experience as an entrepreneur. Future studies are recommended to enhance expertise measurement by incorporating more measurements (e.g. amount of successful venture launches, successful initial public offerings, field knowledge etc.). Furthermore, only overall entrepreneurial passion was examined in this study. While entrepreneurial passion consists of multiple dimensions, this study chose to combine these dimensions into an overarching variable. Future studies could provide additional attention to each separate dimension.

Moreover, following Cardon et al. (2013) and Epstein et al. (1996), this study portrays and measures entrepreneurial passion and cognitive style as a personal trait or a relatively stable characteristic. Due to the subjective nature of most questions, these could be influenced by time or specific circumstances. For example, some authors suggest that people can change their cognitive state in order to meet requirements of a specific situation (Kogan, 1980; Laurillard, 1979; Zhong, 2011). Additionally, due to the complex and subjective nature of cognitive style, researchers remain undecided whether the intuitive and analytical style are supposed to be constructed in a bimodal or unimodal manner. This study chose to follow the model proposed by Epstein et al. (1996) which discusses this issue in further detail and ultimately decided to measure cognitive styles using two unipolar scales. In line with this, the results of this study do not display a significant inverse relationship between the two cognitive styles, which supports the unimodal approach.

Future research could further investigate a potential mediator effect of cognitive style in the relationship between entrepreneurial passion and success. While results of this study show some interesting signs, ultimately a mediator effect can not be concluded. Especially in combination with more elaborate success measures this could provide more conclusive evidence whether this mediator effect exists or not.

Finally, future studies could zoom in on the effect of entrepreneurial passion on both cognitive styles. Interestingly, this study found a positive relationship with both cognitive styles. This raises the question whether more passionate entrepreneurs potentially spend more time on contemplating decisions.

## 7. Conclusion

This study examined the complex phenomena of entrepreneurial passion, cognitive style and entrepreneurial success and how these concepts are related. Data was collected of 155 entrepreneurs based in the USA, spread across different states. This study found a significant relationship between entrepreneurial passion and both cognitive styles, which confirms theoretical propositions that these concepts are interconnected. Additionally, this study provides scientific proof for the fact that entrepreneurial passion has a significant relationship with entrepreneurial success. Finally, a significant relationship between the intuitive cognitive style and entrepreneurial success was found. With these insights, this study aims to contribute valuable new insights to the field of entrepreneurial research, aid entrepreneurs in their endeavors by shedding light on complex mechanisms that influence entrepreneurship, and help investors improve their selection criteria in order to lead to more successful outcomes.

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## 10. Appendices

### 10.1 Appendix A: Items of measurement

**Figure 1.** 10-item REI developed by Epstein et al. (1996)

#### *Factor Loadings of the Rational–Experiential Inventory (REI) Items*

REI scale and item	Factor	
	1	2
<b>Need for Cognition</b>		
I don't like to have to do a lot of thinking. (R)	<b>.77</b>	–.01
I try to avoid situations that require thinking in depth about something. (R)	<b>.73</b>	–.03
I prefer to do something that challenges my thinking abilities rather than something that requires little thought.	–.73	.13
I prefer complex to simple problems.	–.63	–.01
Thinking hard and for a long time about something gives me little satisfaction.	<b>.59</b>	.00
<b>Faith in Intuition</b>		
I trust my initial feelings about people.	–.01	<b>.79</b>
I believe in trusting my hunches.	.02	<b>.73</b>
My initial impressions of people are almost always right.	–.10	<b>.70</b>
When it comes to trusting people, I can usually rely on my “gut feelings.”	–.05	<b>.63</b>
I can usually feel when a person is right or wrong even if I can't explain how I know.	.00	<b>.59</b>
<b>Eigenvalue</b>	2.62	2.19

*Note.*  $N = 973$ . Values in boldface type indicate the highest factor loading for each item. (R) = reverse scored.

**Figure 2.** Inventory of items that form the construct of EP and its domains developed by Cardon et al. (2013)

Instructions, scale anchors, and items for EP's dimensions and domains.

Instructions	Please indicate the extent to which you agree or disagree with each statement.
Scale anchors	1 = 'strongly disagree'; 2 = 'disagree'; 3 = 'neither agree nor disagree'; 4 = 'agree'; 5 = 'strongly agree'. Note: We recommend that scholars using this instrument consider using 7-point or 9-point scales to guard against issues of range restriction. Note: Please see <a href="#">Appendix B</a> for other identity centrality items that could be included in future studies.
Domain and item #	Validated item
IPF-inv <sub>1</sub>	It is exciting to figure out new ways to solve unmet market needs that can be commercialized.
IPF-inv <sub>2</sub>	Searching for new ideas for products/services to offer is enjoyable to me.
IPF-inv <sub>3</sub>	I am motivated to figure out how to make existing products/services better.
IPF-inv <sub>4</sub>	Scanning the environment for new opportunities really excites me.
IC-inv <sub>1</sub>	Inventing new solutions to problems is an important part of who I am.
IPF-fnd <sub>1</sub>	Establishing a new company excites me.
IPF-fnd <sub>2</sub>	Owning my own company energizes me.
IPF-fnd <sub>3</sub>	Nurturing a new business through its emerging success is enjoyable.
IC-fnd <sub>1</sub>	Being the founder of a business is an important part of who I am.
IPF-dev <sub>1</sub>	I really like finding the right people to market my product/service to.
IPF-dev <sub>2</sub>	Assembling the right people to work for my business is exciting.
IPF-dev <sub>3</sub>	Pushing my employees and myself to make our company better motivates me.
IC-dev <sub>1</sub>	Nurturing and growing companies is an important part of who I am.

*Note.* IPF = intense positive feelings; IC = identity centrality; inv = inventing; fnd = founding; and dev = developing.

**Figure 3.** Overview of items that measure entrepreneurial success; solely the four items in the top half of this table will be used based on the study by Fisher et al. (2014)

I am successful if I:	Factor
ES7 – am personally satisfied with my life and business	0.76
ES5 – do only that which I want to do in life and business	0.65
ES6 – continually grow my business	0.59
ES9 – exceed the business goals I set out to achieve in founding at least one business	0.48
ES3 – receive public recognition from others e.g. awards, remunerated board seats, speaker invitations	Removed at CFA, non-significant
ES8 – achieve the business goals I set out to achieve in founding at least one business	Removed at CFA – redundant, similar to ES9
ES2 – build a business sustainable beyond my personal involvement	Removed at EFA
ES4 – exit or sell some of my business for profit	Removed at EFA
ES10 – never fail	Removed at EFA



## 10.2 Appendix B: Descriptive statistics

**Table 1.** Frequency table of entrepreneurial experience

Variable	Group	Frequency	Percent	Cumulative Percent
Entrepreneurial experience	1-2 years	64	41,3	41,3
	3-5 years	45	29,0	75,5
	6-10 years	21	13,5	89,0
	11-20 years	8	5,2	46,5
	More than 20 years	17	11,0	100,0
	Total	155	100,0	

**Table 2.** Frequency tables of diversity variables

Variable	Group	Frequency	Percent	Cumulative Percent
Gender	Female	50	32,3	32,3
	Male	105	67,7	100,0
	Total	155	100,0	
State	Alabama	1	0,6	0,6
	California	30	19,4	20,0
	Canada - Nova Scotia	1	0,6	20,6
	District of Columbia	1	0,6	21,3
	Florida	1	0,6	21,9
	Georgia	61	39,4	61,3
	Illinois	4	2,6	63,9
	Massachusetts	1	0,6	64,5
	Michigan	1	0,6	65,2
	Mississippi	12	7,7	72,9
	Missouri	2	1,3	74,2
	New Jersey	2	1,3	75,5
	Oregon	1	0,6	76,1
	Pennsylvania	1	0,6	76,8
	South Carolina	1	0,6	77,4
	Tennessee	32	20,6	98,1
	Texas	2	1,3	99,4
	Virginia	1	0,6	100,0
	Total	155	100,0	
Study background	Business Administration	45	29,0	29,0
	Computer Science & IT	12	7,7	36,8
	Creative arts & design	6	3,9	40,6
	Engineering & Technology	30	19,4	60,0
	Entrepreneurship	10	6,5	66,5
	Health & Wellbeing	5	3,2	69,7
	Humanities & culture	15	9,7	79,4

	Law	8	5,2	84,5
	Media & Communications	9	5,8	90,3
	Natural Sciences & Mathematics	10	6,5	96,8
	Teaching & Education	5	3,2	100,0
	Total	155	100,0	
Industry type	Biotechnology	1	0,6	0,6
	Consulting	4	2,6	3,2
	Education	3	1,9	5,2
	Finance	6	3,9	9,0
	Health care and social assistance	27	17,4	26,5
	Information and communications technology	47	30,3	56,8
	Law	3	1,9	58,7
	Manufacturing	8	5,2	63,9
	Media and Entertainment	5	3,2	67,1
	Non-profit	3	1,9	69,0
	Other	9	5,8	74,8
	Real estate	6	3,9	78,7
	Retail trade	23	14,8	93,5
	Staffing	2	1,3	94,8
	Transportation and warehousing	5	3,2	98,1
	Utilities	1	0,6	98,7
	Wholesale trade	2	1,3	100,0
		Total	155	100,0

**Table 3.** Descriptive statistics of metric control and main variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
CV1Age	155	19	66	33,37	11,873
CV3EducationLevel	155	1,00	5,00	3,2000	1,19196
CV4Number of founded ventures	155	0,00	4,00	1,6774	1,22175
CV5EntrepreneurialExperience	155	1,00	5,00	2,1548	1,31496
CV6Number of employees employed	155	1,00	7,00	2,8129	1,38539
Analytic-rational style combined scale	155	2,00	5,00	4,2426	0,58775
Intuitive-experiential style combined scale	155	1,00	5,00	3,8581	0,68489
Entrepreneurial passion overall	155	3,23	7,00	6,0124	0,84272
Entrepreneurial success	155	1,50	5,00	3,8048	0,74199
Valid N (listwise)	155				

### 10.3 Appendix C: Factor analyses

**Table 1.** Total variance explained cognitive style

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3,237	32,374	32,374	2,804	28,037	28,037	2,802
2	2,183	21,827	54,201	1,564	15,643	43,680	1,564
3	0,908	9,081	63,283				
4	0,876	8,759	72,041				
5	0,629	6,286	78,327				
6	0,552	5,520	83,847				
7	0,497	4,968	88,815				
8	0,479	4,791	93,606				
9	0,341	3,407	97,013				
10	0,299	2,987	100,000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

**Table 2.** Rotated factor loading matrix cognitive style

Question	Factor	
	1 Faith in intuition (intuitive style)	2 Need for cognition (analytical style)
1 CS1A Rev		0,552
2 CS2A Rev		0,683
3 CS3A		0,685
4 CS4A		0,481
5 CS5A Rev		0,288
6 CS6I	0,770	
7 CS7I	0,746	
8 CS8I	0,730	
9 CS9I	0,849	
10 CS10I	0,583	

Extraction Method: Principal Axis Factoring.

Rotation Method: Varimax with Kaiser Normalization.

Cross-loading items were not removed from the analysis because summed scaled have already been proven appropriate. Loadings of less than ,25 are suppressed.

**Table 3.** Total variance explained for entrepreneurial passion

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	5,993	46,096	46,096	5,580	42,923	42,923	4,295
2	1,625	12,496	58,593	1,200	9,229	52,152	4,087
3	1,127	8,669	67,262	0,736	5,663	57,815	3,051
4	0,730	5,617	72,878				
5	0,707	5,437	78,316				
6	0,537	4,128	82,443				
7	0,415	3,195	85,639				
8	0,402	3,091	88,730				
9	0,369	2,838	91,568				
10	0,330	2,541	94,109				
11	0,281	2,160	96,269				
12	0,259	1,993	98,262				
13	0,226	1,738	100,000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

**Table 4.** Pattern matrix entrepreneurial passion

	Question	Factor		
		1 Passion for founding	2 Passion for inventing	3 Passion for developing
1	EP1inv		0,656	
2	EP2inv		0,823	
3	EP3inv		0,581	0,309
4	EP4inv		0,771	
5	EP5inv		0,608	
6	EP6fnd	0,698	0,267	
7	EP7fnd	0,846		
8	EP8fnd	0,656		0,294
9	EP9fnd	0,610		
10	EP10dev	0,491		0,338
11	EP11dev			0,733
12	EP12dev			0,661
13	EP13dev	0,366		0,345

Cross-loading items were not removed from the analysis because summed scaled have already been proven appropriate. Loadings of less than ,25 are suppressed.

**Table 5.** Structure matrix entrepreneurial passion

	Question	Factor		
		1 Passion for founding	2 Passion for inventing	3 Passion for developing
1	EP1inv	0,440	0,692	
2	EP2inv	0,374	0,808	0,289
3	EP3inv	0,261	0,624	0,464
4	EP4inv	0,414	0,778	0,254
5	EP5inv	0,345	0,647	0,320
6	EP6fnd	0,773	0,557	0,272
7	EP7fnd	0,811	0,368	0,295
8	EP8fnd	0,775	0,417	0,569
9	EP9fnd	0,663	0,335	0,395
10	EP10dev	0,685	0,468	0,587
11	EP11dev	0,423	0,401	0,795
12	EP12dev	0,514	0,365	0,761
13	EP13dev	0,628	0,545	0,591

Cross-loading items were not removed from the analysis because summed scaled have already been proven appropriate. Loadings of less than ,25 are suppressed.

**Table 7.** Entrepreneurial success variance explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,018	50,443	50,443	1,420	35,493	35,493
2	0,940	23,507	73,950			
3	0,556	13,893	87,843			
4	0,486	12,157	100,000			

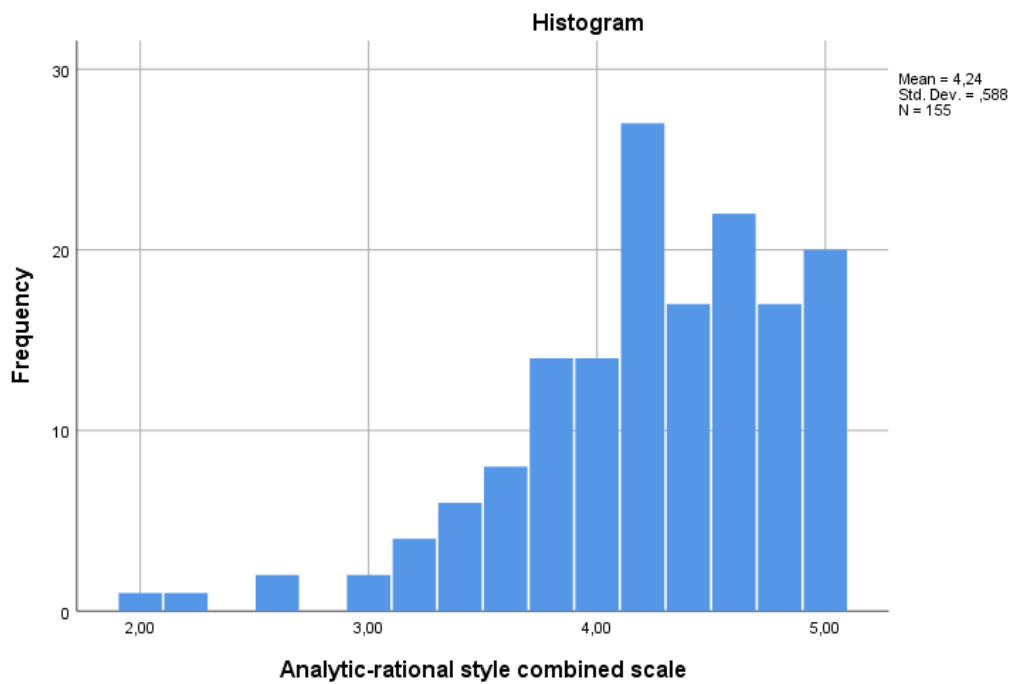
Extraction Method: Principal Axis Factoring.

**Table 8.** Factor matrix entrepreneurial success

	Factor
	1
Suc1	0,642
Suc2	0,352
Suc3	0,709
Suc4	0,618

## 10.4 Appendix D: Assumption tests

**Figure 1.** Histogram of analytic-rational style



**Figure 2.** Q-Q Plot of analytic-rational style

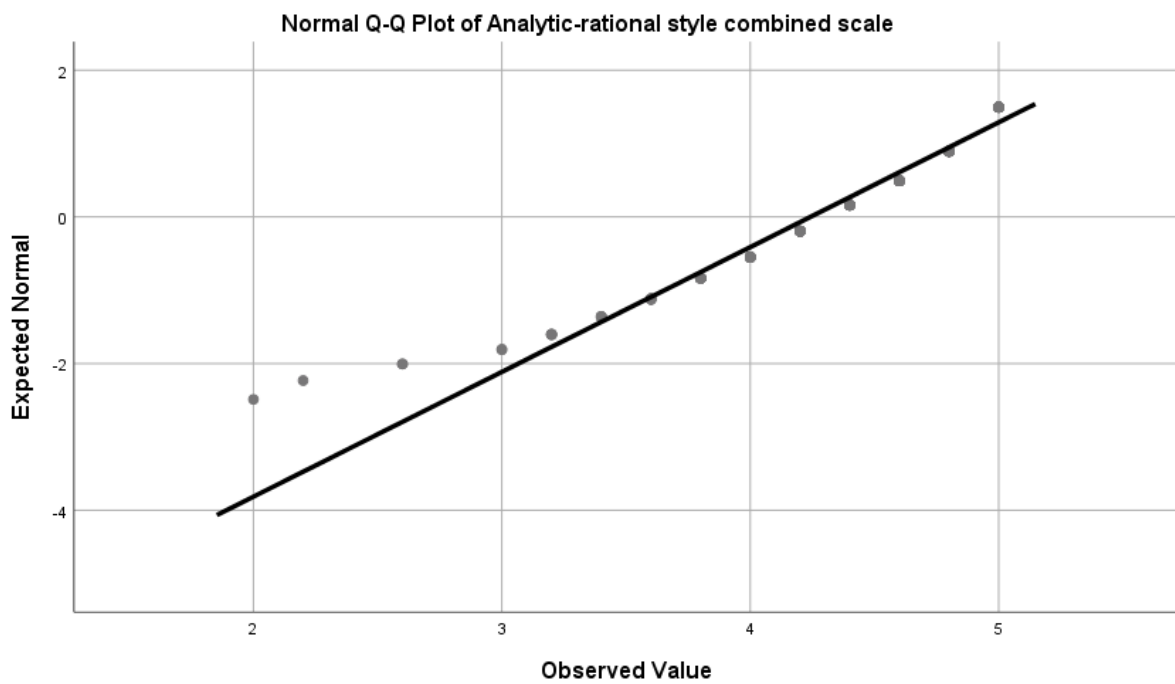


Figure 3. Histogram of intuitive-experiential style

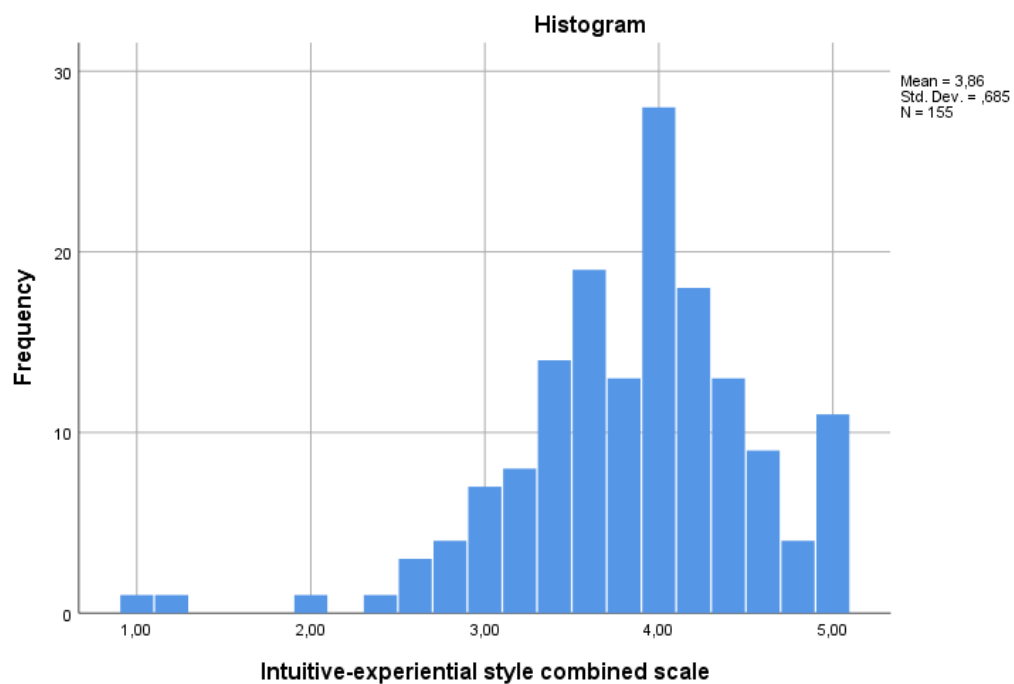


Figure 4. Q-Q Plot of intuitive-experiential style

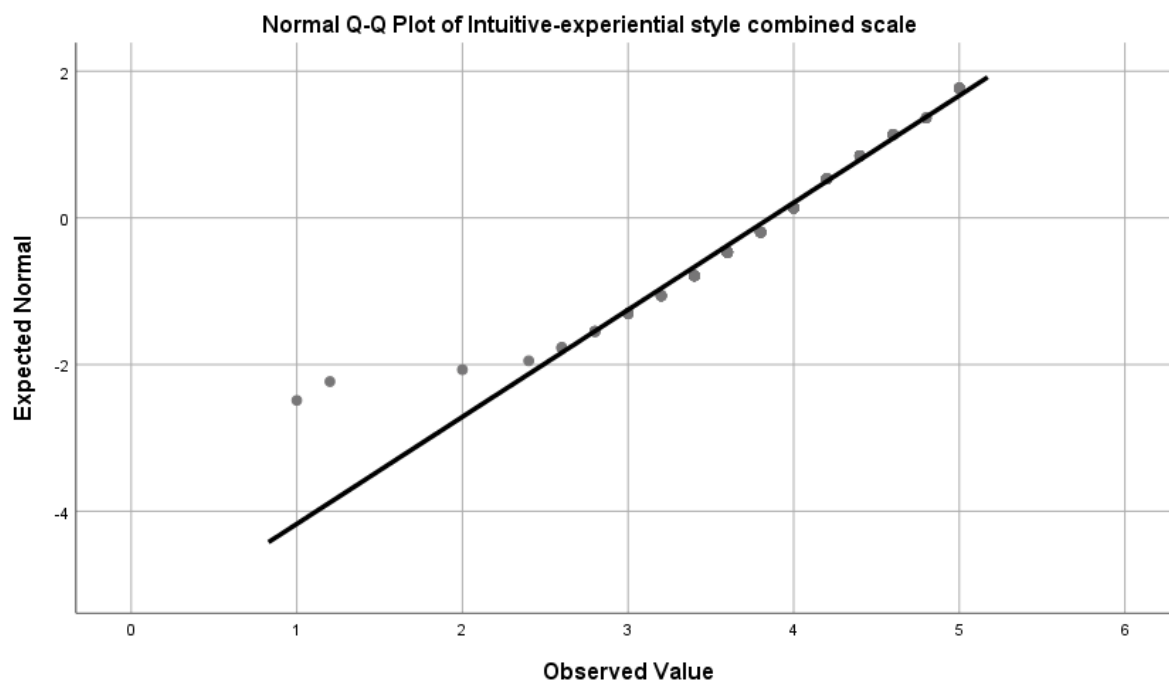


Figure 5. Scatterplot of residuals of the analytical style as dependent variable

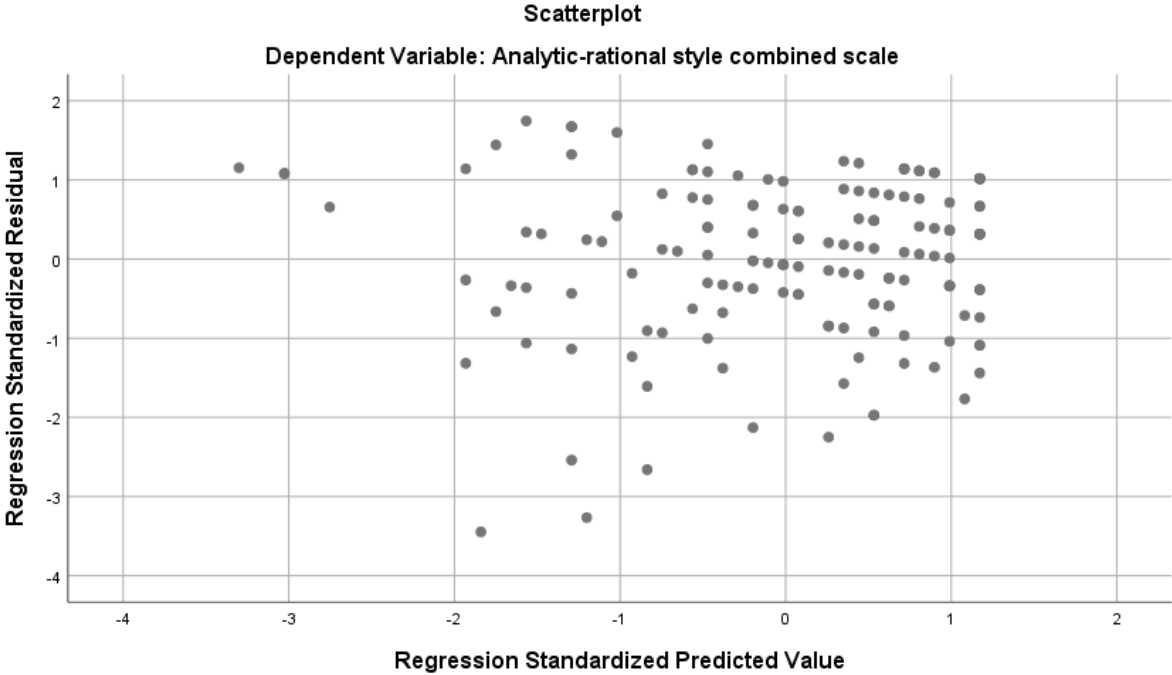
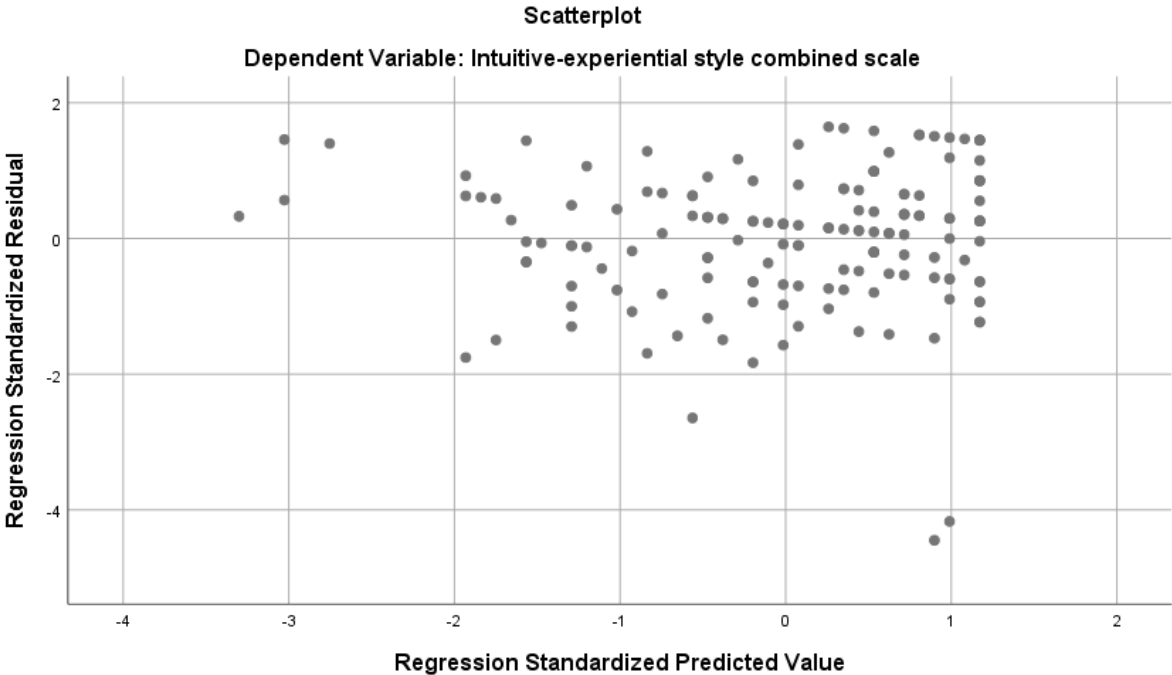
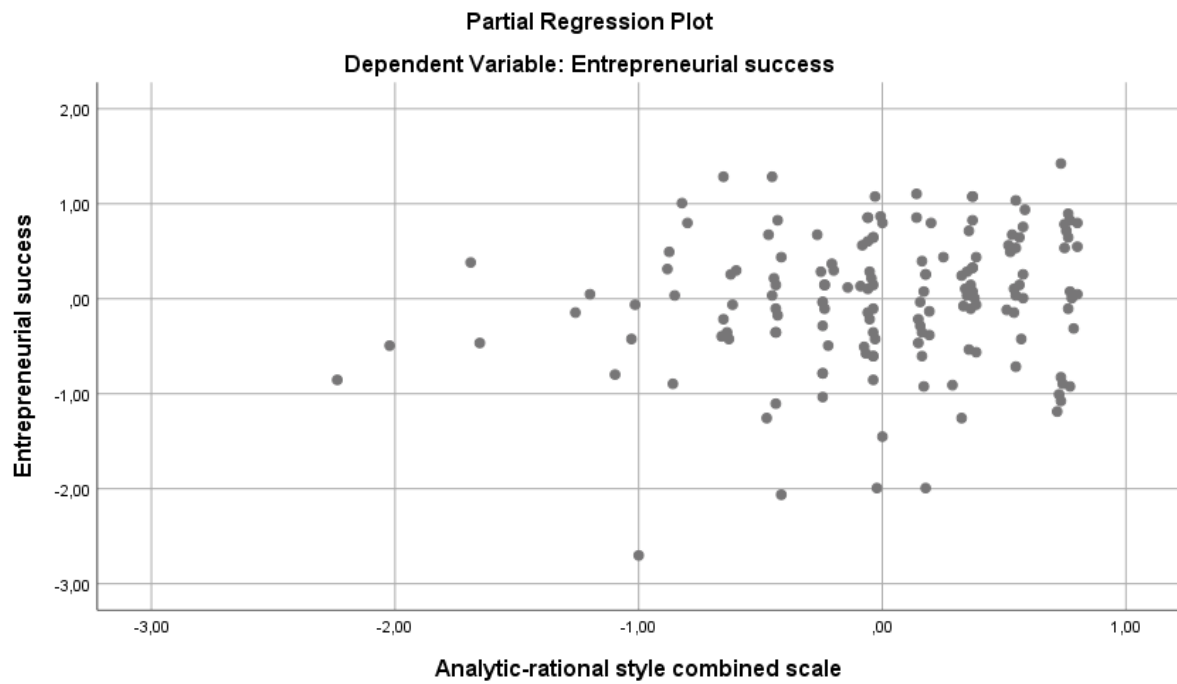


Figure 6. Scatterplot of residuals of the intuitive style as dependent variable

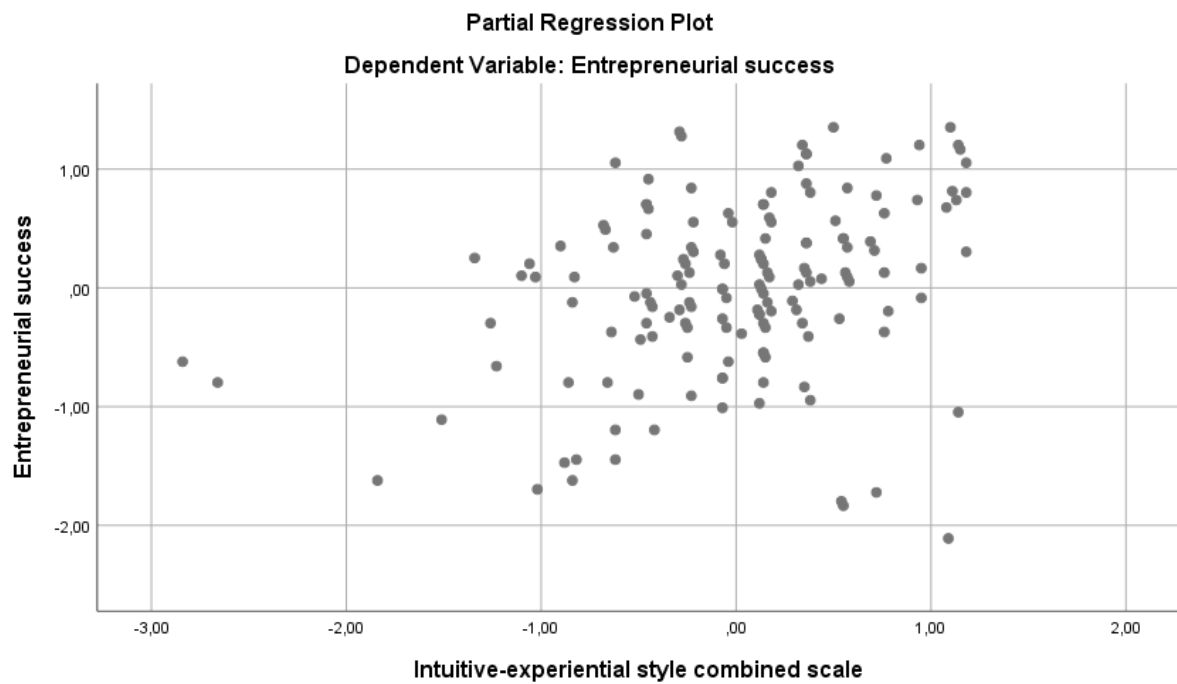




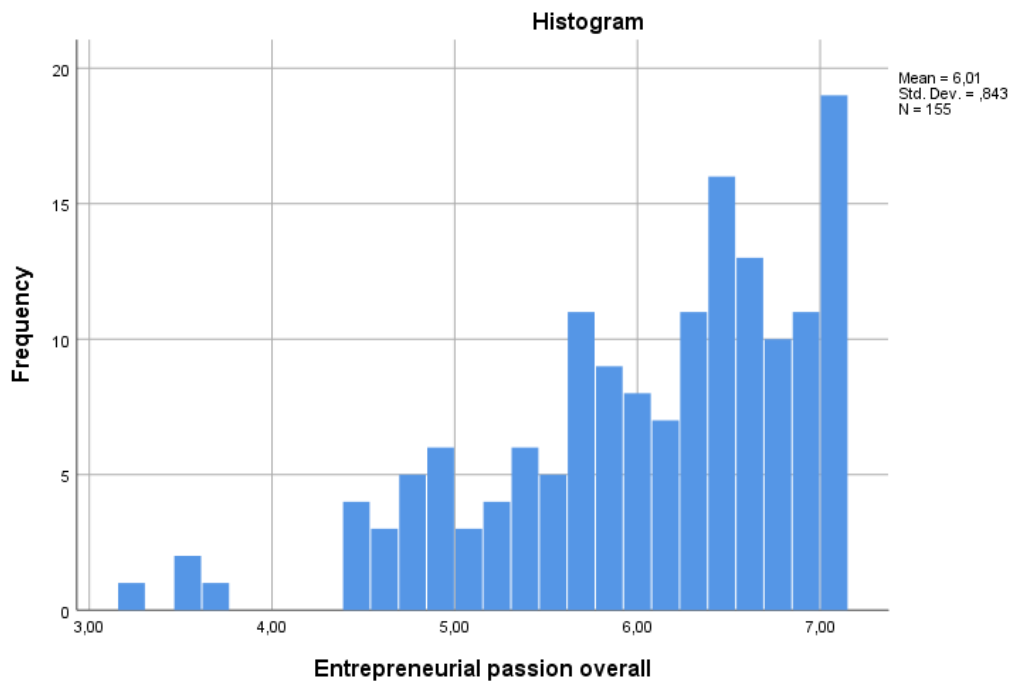
**Figure 7.** Scatterplot of residuals of the analytical style as independent variable



**Figure 8.** Scatterplot of residuals of the intuitive style as independent variable



**Figure 9.** Histogram of entrepreneurial passion



**Figure 10.** Normal Q-Q plot of entrepreneurial passion

