The Association between Personality Traits and Entrepreneurial Intention: The Role of Risk Propensity and Optimism

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Abstract

The population of students forms the base of future entrepreneurs. The present research focuses on the effect of personality traits on entrepreneurial intention (EI) and entrepreneurial orientation (EO). The model based on the Big Five personality traits is augmented by including risk propensity and optimism. Risk propensity is included to examine whether this personality aspect can be viewed as the sixth personality trait of the five-factor model (FFM). Further, by adding interaction terms of optimism and the Big Five personality traits, the present research examines changes in the effect of the Big Five personality traits on EI and EO, for individuals with different levels of optimism. Since literature suggested that positive emotional states stimulate entrepreneurial intentions, optimism is expected to positively moderate the effects of the Big Five personality traits. Results indicate a positive effect of risk propensity on EI and EO, although this personality trait cannot be viewed as a sixth personality trait within the FFM. No evidence was found for a moderating effect of optimism. The results can be used by career counsellors and policy makers in order to determine and stimulate entrepreneurial intention.

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1 Introduction

Entrepreneurship enjoys increasing interest from scholars, but also from policy makers. Due to the important role entrepreneurs play in the modern economy, entrepreneurship is an important field of research (Turker & Selçuk, 2009; Gorgievski & Stephan, 2016). By implementing new ideas and starting new businesses, entrepreneurs generate employment, productivity growth, and innovations (Van Praag & Versloot, 2007). Therefore, entrepreneurship stimulates economic growth and helps the economy recover from economic recessions (Zahra, 1999; Koellinger & Thurik, 2012).

Since starting a business is an individual decision, many studies have focused on the personality aspects of entrepreneurs (Zhao, Seibert, & Lumpkin, 2010; Brandstätter, 2011). These studies have shown that personality plays a role in the decision to become an entrepreneur.

According to scholars, 'the entrepreneur' cannot be clearly defined. The concept is very broad, which results in many different complementing and contradicting definitions (Schumpeter, 1934; Knight, 1921; Gartner, 1988). Regarding the definition of 'the entrepreneur', the present research focuses on two entrepreneurial concepts. The first concept is entrepreneurial intention (Liñán & Chen, 2009) referred to as the willingness to become an entrepreneur. The second concept is entrepreneurial orientation, which comprises the personal characteristics or attitudes an individual possesses that increase propensity to engage in and be successful at entrepreneurial activities (Covin & Slevin, 1989; Langkamp Bolton & Lane, 2012). Using these concepts, the present research will focus on personality aspects of individuals.

The present research will consist of two parts. First, the role of the Big Five personality traits (McCrae & Costa, 1991) in entrepreneurial intention will be investigated. Replicating the research by Brandstätter (2011), the Five Factor Model (FFM) will be used. As an addition, risk propensity will be added as a sixth personality trait, explaining entrepreneurial intention. The first research question will therefore be:

- *Does risk propensity contribute to the explanation of entrepreneurial intention?*

Second, the moderating effect of optimism on the relationship between the Big Five and entrepreneurial intention will be examined. Since the group of entrepreneurs is heterogeneous (Kerr et al., 2018), it is important to understand this heterogeneity in order to match the entrepreneurs to the right environment and let them make full use of their entrepreneurial potential. Therefore, the present research will focus on the different relation of personality traits and entrepreneurial intention, between different character types. The second research question will be as follows:

- *Does optimism contribute to the explanation of entrepreneurial intention by the Big Five personality traits?*

The present paper will continue as follows. First, previous studies regarding the subject will be discussed in the theoretical framework. Second, the data and methodology of the present research will be explained. Third, the results of the regressions will be presented and discussed. Some robustness checks will be added by using different types of models and comparing the results for entrepreneurial intention and for entrepreneurial orientation. Finally, a conclusion will be drawn from the results.

2 Theoretical framework

Research on the personality traits of entrepreneurs is a subject that is approached from many different scientific perspectives, such as psychology, economics and sociology. A large part of recent literature is focused on what personality traits predict entrepreneurship, and the effect of personality traits on the performance of an entrepreneur. These questions are often answered by comparing the characteristics of entrepreneurs and non-entrepreneurs and by examining the effect of personality traits on performance indicators such as earnings (Baron, 2004).

For example, Steward and Roth (2001) examined the differences in risk propensity between entrepreneurs and managers. Zhao and Seibert (2006) compared entrepreneurs' and managers' Big Five personality traits. Regarding entrepreneurial intention, Zhao, Seibert, and Lumpkin (2010) complement the research by Zhao and Seibert (2006), focussing on entrepreneurial intention and performance.

The aim of the present research is not to compare entrepreneurs to other individuals, but to determine which individuals want to become an entrepreneur, by measuring entrepreneurial intention. Defining similarities in personality between entrepreneurs can be very useful, since entrepreneurs have a large impact on the world economy by inventing new businesses and stimulating innovations (Turker & Selçuk, 2009).

The concept of the Big Five personality traits is the most used concept by researchers investigating personality and entrepreneurship. It is often used as a base to include other traits in order to create a complete model that predicts entrepreneurship (Kerr et al., 2018). In the present research, the concepts of entrepreneurial intention and the Five-factor model (FFM) will be explained firstly. Next, two psychological traits, risk propensity and optimism, will be discussed, in relation to the Big Five and entrepreneurial intention. These concepts will be used in order to improve the FFM for predicting entrepreneurial intention.

2.1 Entrepreneurial intention

Consistent with previous literature (e.g., Stewart & Roth, 2001; Rauch & Frese, 2007; Zhao et al., 2010), an entrepreneur is defined in the present paper as the founder, owner, and manager of a (small)

business. Further, entrepreneurial intention will be defined as the expressed behavioural intention to become an entrepreneur (Bird, 1988). The construct of behavioural intention is based on the theory of reasoned action, developed by Fishbein and Ajzen (1975). Behavioural intention is considered to be the most immediate antecedent of a given behaviour (Zhao et al., 2010). In order to improve the theory of reasoned action, Ajzen (1991) developed a construct that is known as the theory of planned behaviour, stating that intention is the most important factor in predicting behaviour. This is because intention indicates how hard an individual is willing to try, i.e. how much effort an individual will exert, in order to perform the behaviour (Ajzen, 1991). In the context of entrepreneurship, evidence for the Theory of Planned Behaviour is found by Kautonen, Van Gelderen, and Fink (2015). Regarding entrepreneurship, intention reflects the willingness to create a new venture (Davidsson, 2004). It is not comparable to an expectation or prediction, but entrepreneurial intention is seen as a proactive commitment to create a new venture in the future (Thompson, 2009; Mwiya, Wang, Shikiaputo, Kaulungombe, & Kayekesi, 2017). Since becoming an entrepreneur is a conscious decision (Wilson, Kickul, & Marlino, 2007), an entrepreneurial career decision can be explained by intention models (Ozaralli & Rivenburgh, 2016). Studying entrepreneurial intentions of individuals has been a common approach to analyse entrepreneurship (Zhao, Hills, & Seibert, 2005).

2.2 Entrepreneurial orientation

An alternative entrepreneurial concept regarding entrepreneurial intention, is entrepreneurial orientation (EO). Strong individual EO scores may indicate that individuals want to be entrepreneurs, or, if they want to become entrepreneurs, their EO score may be higher (Langkamp Bolton & Lane, 2012). Rauch, Wiklund, Lumpkin, and Frese (2009) define entrepreneurial orientation as "the strategy making processes that provide organizations with a basis for entrepreneurial decisions and actions".

Predominantly, EO has been studied in relation to firm performance. In EO research, the concept is described by three to five behaviours that were developed out of business strategy and entrepreneurship literature: innovativeness, willingness to take risk, proactiveness, autonomy, and competitive aggressiveness (Rauch et al., 2009; Miller, 1983; Covin & Slevin, 1989; Lumpkin & Dess, 1996). Most research has focused on the first three behaviours, while autonomy and competitive aggressiveness have been studied less often.

Entrepreneurial orientation can be measured at the firm level (Covin & Slevin, 1989), or at the individual level (Langkamp Bolton & Lane, 2012). Individual entrepreneurial orientation is a direct result of the measures inherent in the original entrepreneurial orientation scale. For example, individuals can easily be observed as risk takers or non-risk takers, as innovative or not (Langkamp Bolton & Lane, 2012).

Regarding individual EO and the effect of personality characteristics, Okhomina (2010) found some support for the relationship between personality traits and EO, using EO as the dependent variable. Langkamp Bolton and Lane (2012) argue that the Big Five personality traits may have an influence on EO as well. For example, autonomy could be influenced by extraversion and openness (Lumpkin & Dess, 2001; Claes, Beheydt, & Lemmens, 2005). Competitive aggressiveness could also have a relationship with extraversion (Lumpkin & Dess, 2001).

2.3 Big Five personality traits

The five-factor model (FFM) developed by McCrae and Costa (1991), consisting of the Big Five personality traits, describes human personality using five dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism. Theory suggests that these personality traits should be viewed as important determinants of entrepreneurial intention (Zhao, Seibert, & Lumpkin, 2010). The Big Five personality approach can be used to determine personality differences between entrepreneurs and non-entrepreneurs (Goldberg, 1990). Each trait has its own influence on the intention to become an entrepreneur (John, Naumann, & Soto, 2008). Below each of the five personality traits and their association with entrepreneurial intention will be discussed.

2.3.1 Openness

Openness or openness to experience is a trait that means curious, imaginative and creative (John et al., 2008). Scoring high on openness means you create new ideas and standards. Openness is correlated with aspects of creative intelligence (McCrae, 1987)**.** Following Schumpeter's (1942) "creative destruction" theory, entrepreneurs are characterized by creativity and by resisting conventional thoughts (Locke, 2000). Several studies have found openness to be a significant factor in the relationship between personality and entrepreneurship (Howard & Howard, 1995; Singh & DeNoble, 2003). Since self-employment is an unconventional mode of employment, openness is found to be positively associated with entrepreneurial intention (Zhao et al., 2010).

2.3.2 Conscientiousness

The personality trait conscientiousness describes socially prescribed impulse control that facilitates task- and goal-directed behaviour. Examples are thinking before acting, following norms and rules, and prioritizing tasks (John et al., 2008). People who are conscientious, tend to be efficient, organized, systematic (Goldberg, 1990), and practical (Saucier, 1994). Conscientiousness is reported to be positively correlated with entrepreneurial intention (Zhao et al., 2010). People who have the intention to become

an entrepreneur, also are more likely to score high on conscientiousness according to Howard and Howard (1995).

2.3.3 Extraversion

Extraversion implies an energetic approach toward the social and material world and includes traits such as sociability, activity, assertiveness, and positive emotionality (John et al., 2008). Extravert people tend to be dominant (John, 1990), active (Goldberg, 1990), and energetic (Saucier, 1994). According to Zhao et al. (2010), extraversion shows significant correlations with intentions to become an entrepreneur. An entrepreneurial person is found to score high on extraversion (Howard & Howard, 1995).

2.3.4 Agreeableness

Agreeableness contrasts a prosocial and communal orientation toward others with antagonism and includes traits such as altruism, tendermindedness, trust, and modesty (John et al., 2008). This personality trait shows the willingness to protect self-interest, and to influence others (Ariani, 2013). However, in previous literature, no significant correlation between agreeableness and entrepreneurial intentions is found (Brandstätter, 2011). This might be due to the fact that agreeableness includes traits that can be related to entrepreneurship in both directions (Antoncic, Bratkovic Kregar, Singh, & DeNoble, 2015). Howard and Howard (1995) viewed the entrepreneur-type as scoring average on agreeableness.[1]

2.3.5 Neuroticism

Neuroticism contrasts emotional stability and even-temperedness with negative emotionality, such as feeling anxious, nervous, sad, and tense. Zhao et al. (2010) report negative effects of neuroticism on entrepreneurial intentions. Emotional stability is found to lead to autonomy, independence, and individualism (Goldberg, 1990). These characteristics are often associated with entrepreneurs (Van Gelderen, Jansen, & Jonges, 2003). Singh and DeNoble (2003) found a negative relationship between neuroticism and self-employment.

2.4 Risk propensity

Not all personality aspects can be located in the Big Five model (Paunonen & Jackson, 2000). Narrow personality traits predict entrepreneurial intention better than broad traits such as the Big Five (Leutner, Ahmetoglu, Akhtar, & Chamorro-Premuzic, 2014; Rauch & Frese, 2007). The most important of these narrow traits regarding research on entrepreneurial intention, is risk propensity (Rauch & Frese, 2007).

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[1] The results of the model that explains entrepreneurial intention using a dummy variable for average levels of agreeableness are included in Appendix 2.

Risk propensity is defined as a personality trait involving the willingness to pursue decisions or courses of action involving uncertainty regarding success or failure outcomes (Jackson, 1994). As a personality trait, it is viewed by some scholars as a specific combination of scores for the Big Five personality traits (Nicholson, Fenton-O'Creevy, Soane, & Wilman, 2005). Other scholars find that risk propensity can be seen as a sixth personality dimension, which is not incorporated into the Big Five (Paunonen & Jackson, 1996). In the present research, risk propensity will be added to the model as a sixth dimension outside the FFM, to examine whether risk propensity can be an addition to the model explaining entrepreneurial intention. The willingness to take risk is viewed as an important trait associated with entrepreneurs (Stewart & Roth, 2001; Baron, 2007). Ever since Cantillon (1755), bearing risk is a key attribute of the entrepreneurial definition. Hmieleski and Corbett (2006) found that individuals with higher levels of risk propensity have stronger levels of entrepreneurial intention. Further, Gürol and Atsan found that students tending to be an entrepreneur had higher scores on risk-taking propensity. Zhao et al. (2010) state that risk-taking propensity is the best predictor of entrepreneurial intentions compared to other entrepreneurial factors. Based on the findings in the literature above, the first hypothesis will be as follows:

Hypothesis H1: Risk propensity is positively associated with entrepreneurial intention.

2.5 Optimism

As entrepreneurs are considered to be over-optimistic (Puri & Robinson, 2005; Parker, 2006), the present research will examine the direct effect of optimism on entrepreneurial intention. Further, it will be tested whether the relation between the Big Five and entrepreneurial intention differs between different types of psychological characters, determined by the level of optimism. Therefore, for the second part of the research, the research question will be as follows:

- *Does optimism contribute to the explanation of entrepreneurial intention by the Big Five personality traits?*

Although it has been suggested that optimists may be more willing to take risks if they perceive the odds to be in their favour, Puri and Robinson (2005) find low correlations between risk attitude and optimism. An optimist is defined as a person looking at the bright side of things, and expecting positive and desirable events happening in the future (Seligman, 2006). Since new ventures mostly fail (Knaup, 2005) and creating new ventures is a time-consuming and complicated process, positive emotions seem to be necessary for entrepreneurial activity (Ozaralli & Rivenburgh, 2016). Previous research has found that positive emotional states such as optimism have been reported as essential for successful leaders of

high-tech start-ups (Peterson, Walumbwa, Byron, & Myrowitz, 2009). Also, optimistic students' entrepreneurial intentions are found to be higher (Janssen, Giacomin, & Shinnar, 2013). A possible explanation could be that optimistic entrepreneurs are able to cope with challenges more easily (Hmieleski & Baron, 2009). These findings lead to the second hypothesis:

Hypothesis H2: Optimism is positively associated with entrepreneurial intention.

Although very little evidence of a possible moderating effect of optimism on the relationship of the Big Five personality traits and optimism is available, a new field of research will be explored by combining elements of the cited literature. Since positive emotional states have been reported to stimulate entrepreneurial intentions (Janssen et al., 2013), optimism is expected to positively moderate the relationship between the Big Five personality traits and entrepreneurial intention. For example, for personality traits that are positively associated with entrepreneurial intention, the positive effect is expected to be stronger for optimistic individuals (Puri & Robinson, 2005). On the other hand, for personality traits that are negatively associated with entrepreneurial intention, the negative effect is expected to be weaker for optimistic individuals. Based on the above findings, the following hypotheses will be constructed:

Hypothesis H3a: The interaction term of optimism and openness is positively associated with entrepreneurial intention.

Hypothesis H3b: The interaction term of optimism and conscientiousness is positively associated with entrepreneurial intention.

Hypothesis H3c: The interaction term of optimism and extraversion is positively associated with entrepreneurial intention.

Hypothesis H3d: The interaction term of optimism and agreeableness is positively associated with entrepreneurial intention.

Hypothesis H3e: The interaction term of optimism and neuroticism is positively associated with entrepreneurial intention.

2.6 Control variables

Not all previous studies include control variables. Control variables regarding internal factors are considered to be incorporated in the Big Five personality traits and will therefore not be included in the model. Since the Big Five are meant to explain all aspects of one's personality, a multicollinearity problem could rise if e.g. gender or age are included. This argument is supported in the literature, as for example females generally tend to be more agreeable than males (Costa et al., 2001). This would mean

that, if gender is added to the model, the effect of agreeableness on entrepreneurial intention will be biased. Concerning age as a control variable, the range of this variable is limited, since the dataset consists of students of the age between 18 and 26. For this reason, no effect is expected as the model will only show effects within a few years.

2.6.1 Entrepreneurial parents

Some external factors may affect entrepreneurial intention as well. Lindquist, Sol and Van Praag (2015) found that having entrepreneurial parents increases the chance of becoming an entrepreneur by 60%. Further, Ozaralli & Rivenburgh (2016) argue that parental role models are an important element to increase entrepreneurial intention. Entrepreneurial family background results in a higher intention to start own ventures (Ozaralli & Rivenburgh, 2016). Since this information is included in the dataset, this will be a control variable.

3. Data & Methodology

3.1 Sample

The Dutch dataset was collected in the period between May 2015 and April 2016, from 182 students by the Erasmus School of Economics. It is similar to the dataset used by Bernoster, Rietveld, Thurik, and Torrès (2018). Finally, due to missing observations, the dataset consists of 150 people studying at the Erasmus University Rotterdam. Besides demographics and personal information, it contains data on entrepreneurial intention, orientation, personality and psychological traits, including the Big Five. The average age of the respondents is 20.64 years and 55.33% are female. The used scale items in the present research can be found in Appendix 1.

3.2 Dependent variable

As the dependent variable, entrepreneurial intention (EI) is used. This variable is measured through a list of 6 statements, created by Liñán and Chen (2009), which are answered by the respondents. The statements are rated on a 7-point Likert scale, rating from strongly disagree (1) to strongly agree (7). Subsequently, the scores of each item are summed up and divided by the maximum score of 42. The items on the scale include "I am ready to do anything to be an entrepreneur", "My professional goal is to become an entrepreneur", "I will make every effort to start and run my own firm", "I am determined to create a firm in the future", "I have very seriously thought of starting a firm", and "I have the firm intention to start a firm someday".

Alternatively, entrepreneurial orientation (EO) is used as the dependent variable. In order to measure EO, the individual entrepreneurial orientation scale of Langkamp Bolton and Lane (2012) is used. This

scale is based on three dimensions of entrepreneurial orientation and contains 10 items: 4 for innovativeness, 3 for proactiveness, and 3 for risk taking. The items are measured on a 5-point Likert scale. Example items of each dimension are: "I prefer to try my own unique way when learning new things rather than doing it like everyone else does", (innovativeness), "I tend to plan ahead on projects" (proactiveness), "I am willing to invest a lot of time and/or money on something that might yield a high return" (risk taking).

3.3 Independent variables

The main independent variables are based on the Big Five personality traits. These variables are constructed using a questionnaire, originally containing 44 items (Goldberg, 1992). Time and space to include long questionnaires is often limited, as is the motivation and attention of the participants (Denissen, Geenen, Van Aken, Gosling, & Potter, 2008). Therefore, in the present research, the Big Five Inventory (BFI) containing only 21 items are included. The BFI is designed to measure the Big Five dimensions using as few items as possible while achieving adequate levels of reliability (Denissen et al., 2008). The items are scaled on a 5-point Likert scale, rating from strongly disagree (1) to strongly agree (5). Each personality trait relates to at least 4 of the items. The score of the respondents is also divided by the maximum score of the items relating to the same personality trait.

Risk propensity is measured by 8 items, also scaled on a 5-point Likert scale, rating from strongly disagree (1) to strongly agree (5). Again, the total score of the respondents will be divided by the maximum score, which is 40 in this case. A high score means high risk propensity and vice versa.

Optimism is measured by 10 items on a 5-point Likert scale, known as the Life Orientation Test-Revised (LOT-R) (Scheier, Carver, & Bridges, 1994). The items are "In uncertain times, I usually expect the best", "It's easy for me to relax" (F), "If something can go wrong for me, it will" (R), "I'm always optimistic about my future", "I enjoy my friends a lot" (F), "It's important for me to keep busy" (F), "I hardly ever expect things to go my way" (R), "I don't get upset too easily" (F), "I rarely count on good things happening to me" (R), and "Overall, I expect more good things to happen to me than bad". Items that are marked with (R) are reverse coded. The total score of the respondent will be divided by 30, since 4 of the 10 statements are fillers (F). A higher score means higher optimism.

3.4 Control variables

Not all previous studies included control variables. However, some external factors may affect entrepreneurial intention as well. Lindquist, Sol and Van Praag (2015) found that having entrepreneurial parents increases the chance of becoming an entrepreneur by 60 percent. Since this information is

included in the dataset, this will be used as a control variable. Control variables regarding internal factors are considered to be incorporated in the Big Five personality traits and will therefore not be included in the model. Since the Big Five are meant to explain all aspects of one's personality, a multicollinearity problem could rise if e.g. gender or age are included. This argument is supported in the literature, as for example females generally tend to be more agreeable than males (Costa et al., 2001). This would mean that, if gender is added to the model, the effect of agreeableness on entrepreneurial intention will be biased. Controlling for age in the present research will result in the same multicollinearity problem. Furthermore, since the dataset consists of students of the age between 18 and 26, the range of the ages is limited. For this reason, no effect is expected as the model will only show effects within a few years.

3.5 Model

Table 1 shows the mean, standard deviation and correlations of the used variables. As a rule of thumb, a correlation between two variables higher than 0.5 is marked as a moderate or high correlation (Chiulli, 2018). The highest correlations are found between risk propensity and openness, and between optimism and neuroticism.

Table 1. Correlation results between the variables.

	Mean	Std. dev.	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Extraversion	3.58	0.71	1								
2. Agreeableness	3.37	0.64	0.0627	1							
3. Conscientiousness	3.63	0.65	0.1215	0.0830	1						
4. Neuroticism	2.81	0.87	-0.0438	-0.1186	-0.0676	1					
5. Openness	3.73	0.74	0.2008	-0.0314	-0.0793	0.0143	1				
6. Risk Propensity	0.65	0.14	0.2042	-0.0556	0.0055	-0.1270	0.4815	1			
7. EI	0.49	0.22	0.1453	-0.1038	0.1554	-0.1583	0.2760	0.4040	1		
8. Parents	0.29	0.46	0.0100	-0.1037	0.1750	0.0440	0.0856	0.1944	0.2205	1	
9. Optimism	0.68	0.12	0.1692	0.2603	0.2613	-0.4779	0.0244	0.2316	0.1701	0.1288	1

An OLS regression is used to estimate the effects of the Big Five and to estimate the added effect of risk propensity on entrepreneurial intention, based on the models of Brandstätter (2011) and Zhao and Seibert (2006). Subsequently, the interaction between optimism and each of the Big Five personality traits on the dependent variable will be estimated.

Besides the interaction term, the models include the individual effects of the personality traits on entrepreneurial intention. The model will show the base model, extended with interaction terms between optimism and each of the Big Five personality traits. Also, the control variable for

entrepreneurial parents is included. In order to interpret the direct effect of optimism on entrepreneurial intention as well, the optimism variable will be added to the model.

Based on the findings above, the model equation will be constructed as follows:

$$EI_i =$$
$$\beta_0 + \beta_1 Openness_i + \beta_2 Conscientiousness_i + \beta_3 Extraversion_i + \beta_4 Agreeableness_i$$
$$+ \beta_5 Neuroticism_i + \beta_6 Risk\ propensity_i + \beta_7 Optimism_i$$
$$+ \beta_8 (Openness_i * Optimism_i) + \beta_9 (Conscientiousness_i * Optimism_i)$$
$$+ \beta_{10} (Extraversion_i * Optimism_i) + \beta_{11} (Agreeableness_i * Optimism_i)$$
$$+ \beta_{12} (Neuroticism_i * Optimism_i) + \beta_{13} Parents_i + \varepsilon_i.$$

The equation contains the intercept β_0 and all the independent variables that are used in the model, multiplied by their slope coefficient β. The dependent variable EI_i measures entrepreneurial intention for individual i. EI can take all values between 0 and 1. Second, the Big Five personality traits, i.e. openness, conscientiousness, extraversion, agreeableness and neuroticism are included. These variables take values between 0 and 5. Third, the direct effect of risk propensity and optimism are added, which can take all values between 0 and 1. Finally, the model includes five interaction terms between the Big Five personality traits and optimism, as well as the control variable for entrepreneurial parents and an error term. The entrepreneurial parents variable is a binary variable, which takes value 1 if one of the parents is an entrepreneur, and value 0 otherwise.

3.6 Robustness checks

In order to provide robustness for the results found by using the OLS regression model, some different approaches are made in the methodology.

3.6.1 Logistic regression

First, a logistic regression model is constructed in order to check whether the outcomes of the OLS regression differ. A logistic regression estimates the probability of an outcome. Instead of using a continuous dependent variable, EI will be coded as a binary variable with a value of 1 representing relatively high entrepreneurial intention, and a value of 0 representing relatively low entrepreneurial intention. For a logistic regression model, a linear relationship between dependent and independent variables is not required. Similar results for the logistic regression model compared to the results for the OLS model that explains EI, will indicate the robustness of these results. If two different types of models give more or less the same outcome, the results are more likely to be representative and realistic.

For this model, a dichotomous variable is created to describe entrepreneurial intention. For EI lower than average in the present dataset, i.e. lower than 0.49, the dependent variable will have a value of 0. For values higher than average, the dependent variable will be valued 1.

3.6.2 Entrepreneurial Orientation

For the EO model, an OLS regression model is used, similar to the OLS regression model that is used with EI. The regression is exactly replicated, in order to find similarities and differences between the two regression models. As mentioned in the theoretical framework, EO is an entrepreneurial concept that may indicate that individuals want to be entrepreneurs. Since EO can thus be used as an alternative measurement for EI, the results can be used as a robustness check for the EI model.

3.6.3 Bootstrap aggregating

Bootstrap aggregating is designed to improve the stability and accuracy of regressions. Bootstrap aggregating, also known as bagging, reduces variance and overfitting. This method samples new sets of data, with the same number of observations as the original data sample (Breiman, 1996). By sampling with replacement, some observations may be included multiple times in a sample, while others are excluded (Aslam, Popa, & Rivest, 2007). In the present research, this method is used in five models, each containing the interaction terms of optimism and one of the Big Five personality traits. The bootstrap is repeated 1000 times per model.

4 Results

Table 2 shows all OLS regression results. The direct effects of the Big Five, i.e. openness, conscientiousness, extraversion, agreeableness, and neuroticism, are included in Model 1. Afterwards, in Model 2 and further, the control variable for entrepreneurial parents is included. Then, risk propensity and optimism are added, as well as the interaction terms between optimism and each of the Big Five personality traits.

4.1 Big Five

In Model 1 in Table 2, the regression results of the Big Five on entrepreneurial intention are displayed. The effect of openness on entrepreneurial intention is positive and significant at a 1% significance level. The coefficient of openness is 0.08, which means that an increase in the score on openness by 1 point on average results in an increase of entrepreneurial intention by 0.08. The effect of conscientiousness on entrepreneurial intention is positive as well, and significant at a 5% significance level. The coefficient of conscientiousness is 0.06, which means that an increase in the score on conscientiousness by 1 point on average results in an increase of entrepreneurial intention by 0.06. No significant effect is found for

extraversion. Agreeableness and neuroticism both have a negative effect on entrepreneurial intention in Model 1. The effect of agreeableness is significant at a 10% level, and the effect of neuroticism is significant at a 5% level. An increase of agreeableness by 1 point will, on average, result in a 0.05 decrease of entrepreneurial intention. If neuroticism increases by 1 point, entrepreneurial intention will on average decrease by 0.04.

4.2 Control variables

Model 2 includes the control variable for entrepreneurial parents. The coefficient of the control variable is positive, and significant at a 5% level in Model 2, 5, and 6-10. By adding entrepreneurial parents to the model, the adjusted R-squared increases significantly. The effect of agreeableness loses its significance, but all other results are robust to adding the controls, regarding significance and the size of the coefficients.

4.3 Risk propensity

In Model 3, 5, and 11-15, the personality trait risk propensity is added to the regression. The coefficient of this variable is positive, and it is highly significant in all of the models. This means hypothesis H1 will be accepted. By adding risk propensity to the model, the variable openness loses its significance. In the models including risk propensity, the variable conscientiousness turns significant at a 10% significance level.

4.4 Optimism

Model 4 includes the direct effect for optimism on entrepreneurial intention. Comparing Model 3 and 5, the adjusted R-squared shows a slight decrease when optimism is added to the model. Further, the direct effect of neuroticism loses its significance by adding optimism to the model. In most of the models that include optimism, conscientiousness turns insignificant as well. In most models including both optimism and risk propensity, conscientiousness is significant. In Models 6-10, the interaction terms with each of the Big Five personality traits are added to the model without risk propensity. From Model 11 to Model 15, risk propensity is added as well. The direct effect of optimism in all models is insignificant. Therefore, hypothesis H2 will not be accepted.

Although not significant, the effects of the interaction terms concerning openness, conscientiousness, and agreeableness show a positive sign. The coefficients of the interaction terms with extraversion and neuroticism are negative, and insignificant as well. Since none of the interaction effects are significant, hypothesis H3a, H3b, H3c, H3d, and H3e will all be rejected.

Table 2. OLS regression results for entrepreneurial intention (EI), including the direct effects of the Big Five personality traits, risk propensity, and optimism, and the interaction effects of the Big Five personality traits and optimism.

VARIABLES	Model 1 EI	Model 2 EI	Model 3 EI	Model 4 EI	Model 5 EI	Model 6 EI	Model 7 EI	Model 8 EI	Model 9 EI	Model 10 EI	Model 11 EI	Model 12 EI	Model 13 EI	Model 14 EI	Model 15 EI
Parents		0.08**	0.06	0.08**	0.06	0.08**	0.08**	0.08**	0.08**	0.08**	0.06	0.06	0.06	0.06	0.06
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Openness	0.08***	0.08***	0.04	0.08***	0.04	-0.02	0.08***	0.08***	0.08***	0.08***	-0.12	0.04	0.04	0.04	0.04
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.14)	(0.02)	(0.02)	(0.02)	(0.02)	(0.14)	(0.03)	(0.03)	(0.03)	(0.03)
Conscientiousness	0.06**	0.05*	0.05*	0.04	0.05*	0.04	-0.12	0.04	0.04	0.04	0.05*	-0.14	0.05*	0.04	0.05*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.16)	(0.03)	(0.03)	(0.03)	(0.03)	(0.16)	(0.03)	(0.03)	(0.03)
Extraversion	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.12	0.02	0.02	0.01	0.01	0.12	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.13)	(0.02)	(0.02)	(0.02)	(0.02)	(0.13)	(0.02)	(0.02)
Agreeableness	-0.05*	-0.04	-0.03	-0.04	-0.04	-0.04	-0.05*	-0.04	-0.23	-0.04	-0.04	-0.04	-0.04	-0.20	-0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.19)	(0.03)	(0.03)	(0.03)	(0.03)	(0.18)	(0.03)
Neuroticism	-0.04**	-0.04**	-0.03*	-0.04	-0.03	-0.04	-0.03	-0.04	-0.04	-0.01	-0.03	-0.03	-0.03	-0.03	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.11)	(0.02)	(0.02)	(0.02)	(0.02)	(0.11)
Risk Propensity			0.45***		0.45***						0.48***	0.46***	0.45***	0.45***	0.45***
			(0.14)		(0.14)						(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Optimism				0.12	0.02	-0.40	-0.73	0.69	-0.79	0.24	-0.84	-0.97	0.61	-0.82	0.08
				(0.18)	(0.18)	(0.76)	(0.87)	(0.72)	(0.93)	(0.51)	(0.74)	(0.85)	(0.70)	(0.90)	(0.49)
Openness*Optimism						0.14					0.23				
						(0.20)					(0.20)				
Conscientiousness*Optimism							0.24					0.27			
							(0.24)					(0.23)			
Extraversion*Optimism								-0.15					-0.16		
								(0.19)					(0.18)		
Agreeableness*Optimism									0.27					0.25	
									(0.27)					(0.26)	
Neuroticism*Optimism										-0.04					-0.02
										(0.17)					(0.16)
Constant	0.17	0.19	0.03	0.12	0.02	0.48	0.69	-0.26	0.76	0.05	0.60	0.67	-0.39	0.61	-0.02
	(0.18)	(0.18)	(0.18)	(0.20)	(0.20)	(0.54)	(0.60)	(0.52)	(0.67)	(0.36)	(0.53)	(0.58)	(0.50)	(0.65)	(0.35)
Observations	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
R-squared	0.15	0.18	0.24	0.18	0.24	0.18	0.19	0.19	0.19	0.18	0.24	0.24	0.24	0.24	0.24
Adjusted R-squared	0.122	0.144	0.199	0.141	0.194	0.138	0.141	0.139	0.141	0.136	0.196	0.196	0.193	0.193	0.188

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3 shows the results for the logistic regression model. The order of added variables is similar to Table 2. The control variable Parents is significant and positive in all of the models. This means that having entrepreneurial parents, compared to having non-entrepreneurial parents, increases the probability of having an above average EI. Also, adding the control variable increases the pseudo R-squared significantly. In Model 1, the direct effect of extraversion is now significant as well. The direct effects of agreeableness and neuroticism lose their significance. Regarding the Big Five personality traits, the models shows that an increase in openness, conscientiousness, and extraversion will increase the probability of having an above average EI. Further, higher levels of agreeableness and neuroticism will lead to a lower probability of having relatively high EI. Risk propensity is still highly significant and positive, which means that higher risk propensity increases the chance of having above average EI. The direct effect of optimism and the interaction effects of optimism and the Big Five are not significant in the logistic regression. Overall, the results for the logistic regression model are mostly similar to the outcomes of the OLS regression model.

4.5.2 Entrepreneurial orientation

In all of the models regarding entrepreneurial orientation as the dependent variable, the control variable parents does not have a significant effect. Also, adding the control only has a very small effect on the adjusted R-squared. However, in almost every model, all of the direct effects of the Big Five are significant. The signs for openness, conscientiousness, and extraversion are positive, while the signs for agreeableness and neuroticism are negative. This means, scoring higher levels of openness, conscientiousness, and agreeableness, will lead to an increase of individual entrepreneurial orientation. On the other hand, higher levels of agreeableness and neuroticism lead to a decrease of individual entrepreneurial orientation. These results are in line with the outcomes of the OLS and logistic regression model. Risk propensity also has a highly significant and positive effect on entrepreneurial orientation, but in the EO model, most of the Big Five effects stay significant when adding risk propensity. Concerning the interaction terms of the Big Five traits and optimism, a significant effect for the interaction term between openness and optimism is found. This means, since the sign is positive, being more optimistic increases the positive effect of openness on entrepreneurial orientation. When risk propensity is added to the model as well, the direct effect of optimism on entrepreneurial orientation becomes significant. However, this effect is negative, which means higher levels of optimism

will lead to a decrease in entrepreneurial orientation. Overall, the EO model shows a lot more significant results for the Big Five effects than the EI models.

4.5.3 Bootstrap aggregating

The OLS regression results for entrepreneurial intention using bootstrap aggregated data, are displayed in Table 5. These results slow a little more significance for the direct effects of the Big Five personality traits on entrepreneurial intention. Further, all significant results stay significant, and insignificant results stay insignificant using the bootstrap aggregated data. Also, the sign of the significant results are in line with the sign of the significant results in the regular OLS regression model. The results for the bootstrap aggregated data therefore are in line with the results of the other models.

Table 3. Logistic regression results for entrepreneurial intention (EI), including the direct effects of the Big Five personality traits, risk propensity, and optimism, and the interaction effects of the Big Five personality traits and optimism.

VARIABLES	Model 1 EI	Model 2 EI	Model 3 EI	Model 4 EI	Model 5 EI	Model 6 EI	Model 7 EI	Model 8 EI	Model 9 EI	Model 10 EI	Model 11 EI	Model 12 EI	Model 13 EI	Model 14 EI	Model 15 EI
Parents		1.16***	1.00**	1.11***	0.98**	1.14***	1.13***	1.10***	1.11***	1.11***	1.02**	1.01**	0.97**	0.98**	0.98**
		(0.41)	(0.42)	(0.42)	(0.43)	(0.42)	(0.42)	(0.42)	(0.42)	(0.42)	(0.43)	(0.43)	(0.43)	(0.43)	(0.43)
Openness	0.53**	0.50*	0.12	0.50*	0.12	-0.43	0.52**	0.56**	0.50*	0.50*	-1.49	0.14	0.18	0.13	0.12
	(0.25)	(0.26)	(0.29)	(0.26)	(0.29)	(1.57)	(0.26)	(0.26)	(0.26)	(0.26)	(1.70)	(0.29)	(0.29)	(0.29)	(0.29)
Conscientiousness	0.65**	0.52*	0.56*	0.48	0.55*	0.49	-0.67	0.51*	0.44	0.49	0.58*	-0.93	0.58*	0.50	0.56*
	(0.29)	(0.30)	(0.32)	(0.30)	(0.32)	(0.31)	(1.82)	(0.31)	(0.31)	(0.31)	(0.33)	(1.94)	(0.33)	(0.33)	(0.32)
Extraversion	0.44*	0.50*	0.40	0.47*	0.39	0.45	0.46*	2.69*	0.49*	0.47*	0.35	0.38	2.90*	0.41	0.39
	(0.26)	(0.27)	(0.28)	(0.27)	(0.28)	(0.28)	(0.27)	(1.54)	(0.28)	(0.28)	(0.28)	(0.28)	(1.59)	(0.28)	(0.28)
Agreeableness	-0.39	-0.31	-0.27	-0.36	-0.29	-0.36	-0.39	-0.40	-1.96	-0.36	-0.29	-0.33	-0.33	-1.90	-0.29
	(0.28)	(0.29)	(0.29)	(0.29)	(0.30)	(0.30)	(0.30)	(0.30)	(2.06)	(0.29)	(0.30)	(0.31)	(0.31)	(2.17)	(0.30)
Neuroticism	-0.31	-0.36*	-0.27	-0.28	-0.24	-0.28	-0.27	-0.27	-0.29	-0.59	-0.24	-0.23	-0.23	-0.25	-0.75
	(0.20)	(0.21)	(0.22)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(0.24)	(1.23)	(0.25)	(0.25)	(0.25)	(0.25)	(1.27)
Risk Propensity			4.84***		4.77***						4.96***	4.86***	4.95***	4.75***	4.81***
			(1.71)		(1.73)						(1.73)	(1.74)	(1.75)	(1.73)	(1.73)
Optimism				1.39	0.48	-3.59	-4.85	13.49	-6.50	0.06	-8.12	-7.52	14.19	-7.38	-1.69
				(1.89)	(1.97)	(8.55)	(9.93)	(8.49)	(10.20)	(5.48)	(9.12)	(10.61)	(8.77)	(10.70)	(5.68)
Openness*Optimism						1.35					2.33				
						(2.27)					(2.42)				
Conscientiousness*Optimism							1.71					2.19			
							(2.68)					(2.86)			
Extraversion*Optimism								-3.23					-3.66		
								(2.20)					(2.27)		
Agreeableness*Optimism									2.31					2.31	
									(2.94)					(3.09)	
Neuroticism*Optimism										0.48					0.78
										(1.85)					(1.91)
Constant	-3.81**	-3.92*	-5.78***	-4.67**	-6.02**	-1.26	-0.50	-13.23**	0.86	-3.82	-0.16	-0.65	-15.78**	-0.45	-4.64
	(1.93)	(2.01)	(2.21)	(2.27)	(2.42)	(6.13)	(6.86)	(6.36)	(7.34)	(3.99)	(6.46)	(7.31)	(6.68)	(7.77)	(4.13)
Observations	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Pseudo R-squared	0.0893	0.130	0.173	0.133	0.173	0.134	0.135	0.143	0.136	0.133	0.177	0.176	0.186	0.176	0.174

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4. OLS regression results for entrepreneurial orientation (EO) including the direct effects of the Big Five personality traits, risk propensity, and optimism, and the interaction effects of the Big Five personality traits and optimism.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
VARIABLES	EO	EO	EO	EO	EO	EO	EO	EO	EO	EO	EO	EO	EO	EO	EO
Parents		0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
		(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Openness	0.04***	0.04***	0.02**	0.04***	0.02**	-0.06	0.04***	0.04***	0.04***	0.04***	-0.10**	0.02**	0.02**	0.02**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)
Conscientiousness	0.05***	0.05***	0.05***	0.05***	0.05***	0.05***	0.03	0.05***	0.05***	0.05***	0.05***	0.02	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.06)	(0.01)	(0.01)	(0.01)	(0.01)	(0.06)	(0.01)	(0.01)	(0.01)
Extraversion	0.03***	0.03***	0.02**	0.02**	0.02**	0.02**	0.02**	0.06	0.02**	0.02**	0.02*	0.02**	0.06	0.02**	0.02**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)
Agreeableness	-0.02**	-0.02**	-0.02*	-0.02**	-0.02*	-0.02**	-0.02**	-0.02**	-0.05	-0.02**	-0.02*	-0.02*	-0.02*	-0.04	-0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.07)	(0.01)	(0.01)	(0.01)	(0.01)	(0.07)	(0.01)
Neuroticism	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.05	-0.03***	-0.03***	-0.03***	-0.03***	-0.06
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)
Risk Propensity			0.20***		0.20***						0.22***	0.20***	0.20***	0.20***	0.20***
			(0.05)		(0.05)						(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
Optimism				0.05	-0.00	-0.46	-0.06	0.25	-0.08	-0.05	-0.67**	-0.16	0.22	-0.10	-0.12
				(0.07)	(0.07)	(0.29)	(0.35)	(0.28)	(0.37)	(0.20)	(0.28)	(0.33)	(0.27)	(0.35)	(0.19)
Openness*Optimism						0.14*					0.18**				
						(0.08)					(0.07)				
Conscientiousness*Optimism							0.03					0.04			
							(0.09)					(0.09)			
Extraversion*Optimism								-0.06					-0.06		
								(0.07)					(0.07)		
Agreeableness*Optimism									0.04					0.03	
									(0.11)					(0.10)	
Neuroticism*Optimism										0.03					0.04
										(0.07)					(0.06)
Constant	0.44***	0.45***	0.38***	0.42***	0.38***	0.77***	0.49**	0.28	0.51*	0.48***	0.83***	0.48**	0.23	0.44*	0.45***
	(0.07)	(0.07)	(0.07)	(0.08)	(0.08)	(0.21)	(0.24)	(0.20)	(0.27)	(0.14)	(0.20)	(0.23)	(0.20)	(0.25)	(0.14)
Observations	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
R-squared	0.36	0.37	0.42	0.37	0.42	0.38	0.37	0.37	0.37	0.37	0.45	0.43	0.43	0.42	0.43
Adjusted R-squared	0.338	0.340	0.396	0.338	0.392	0.348	0.334	0.336	0.334	0.334	0.412	0.389	0.391	0.388	0.389

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5. OLS regression results for entrepreneurial intention, using bootstrap aggregated data.

VARIABLES	Model 1 EI	Model 2 EI	Model 3 EI	Model 4 EI	Model 5 EI	Model 6 EI	Model 7 EI	Model 8 EI	Model 9 EI	Model 10 EI
Parents	0.08**	0.08**	0.08*	0.08*	0.08**	0.06	0.06*	0.06	0.06	0.06*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Openness	-0.02	0.08***	0.08***	0.08***	0.08***	-0.12	0.04	0.04	0.04	0.04
	(0.14)	(0.02)	(0.02)	(0.02)	(0.02)	(0.15)	(0.03)	(0.03)	(0.03)	(0.03)
Conscientiousness	0.04	-0.12	0.04	0.04	0.04	0.05*	-0.14	0.05	0.04	0.05
	(0.03)	(0.18)	(0.03)	(0.03)	(0.03)	(0.03)	(0.20)	(0.03)	(0.03)	(0.03)
Extraversion	0.02	0.02	0.12	0.02	0.02	0.01	0.01	0.12	0.01	0.01
	(0.02)	(0.02)	(0.14)	(0.02)	(0.02)	(0.03)	(0.02)	(0.15)	(0.02)	(0.02)
Agreeableness	-0.04	-0.05*	-0.04	-0.23	-0.04	-0.04	-0.04	-0.04	-0.20	-0.04
	(0.03)	(0.03)	(0.03)	(0.20)	(0.03)	(0.03)	(0.03)	(0.03)	(0.19)	(0.03)
Neuroticism	-0.04	-0.03	-0.04	-0.04	-0.01	-0.03	-0.03	-0.03	-0.03	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.13)	(0.02)	(0.02)	(0.02)	(0.02)	(0.15)
Optimism	-0.40	-0.73	0.69	-0.79	0.24	-0.84	-0.97	0.61	-0.82	0.08
	(0.75)	(0.93)	(0.78)	(1.03)	(0.60)	(0.83)	(1.02)	(0.84)	(0.99)	(0.64)
Risk Propensity						0.48***	0.46***	0.45***	0.45***	0.45***
						(0.14)	(0.15)	(0.14)	(0.15)	(0.15)
Openness*Optimism	0.14					0.23				
	(0.20)					(0.22)				
Conscientiousness*Optimism		0.24					0.27			
		(0.26)					(0.29)			
Extraversion*Optimism			-0.15					-0.16		
			(0.21)					(0.22)		
Agreeableness*Optimism				0.27					0.25	
				(0.29)					(0.28)	
Neuroticism*Optimism					-0.04					-0.02
					(0.19)					(0.21)
Constant	0.48	0.69	-0.26	0.76	0.05	0.60	0.67	-0.39	0.61	-0.02
	(0.54)	(0.63)	(0.53)	(0.70)	(0.45)	(0.58)	(0.70)	(0.55)	(0.66)	(0.50)
Observations	150	150	150	150	150	150	150	150	150	150
R-squared	0.18	0.19	0.19	0.19	0.18	0.24	0.24	0.24	0.24	0.24
Adjusted R-squared	0.138	0.141	0.139	0.141	0.136	0.196	0.196	0.193	0.193	0.188

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5 Discussion

Regarding risk propensity, the effect on both entrepreneurial intention and entrepreneurial orientation is positive, meaning that an individual that is willing to take risk, has higher entrepreneurial intention and orientation. These findings are in line with previous research. Risk propensity does predict entrepreneurial intention very well, but since the effects of the Big Five turn insignificant when risk propensity is added, we can conclude that risk propensity is already measured through the FFM. This argument is also supported by previous research (Fenton-O'Creevy, Nicholson, Soane, & Willman, 2004). Therefore, the results found in the present research do not provide evidence for risk propensity as the sixth personality trait of the FFM. However the effect of risk propensity is highly significant, the effects of the other personality traits disappear when risk propensity is added to the EI models.

In previous research, a Big Five pattern for overall risk propensity is found, i.e. high openness and extraversion, combined with low conscientiousness, agreeableness, and neuroticism (Nicholson et al., 2005). The results of the present paper therefore support the findings by Nicholson et al. (2008), suggesting that risk taking can be divided into general and domain-specific. When this is taken into account in future research, it would be possible to determine which part of risk propensity is included in the FFM, and which part(s) would be an addition to the model.

Regarding optimism, there does not seem to be a direct effect nor an interaction effect on entrepreneurial intention. Optimism is a more specific psychological trait, which is related to at least four of the Big Five personality traits: conscientiousness, extraversion, agreeableness, and neuroticism (Sharpe, Martin, & Roth, 2011). The goal of the present research was not to test optimism as a sixth personality trait, but to divide the sample in subgroups by optimism level, in order to test for heterogeneity of the sample based on the level of optimism. Gaining new insights in the heterogeneity of personalities is an important part of the research on personality and entrepreneurship. Since no effects for the interaction terms of optimism and the Big Five personality traits are found, we can conclude that the effects of the Big Five on entrepreneurial intention do not differ for different levels of optimism, regarding our sample.

6 Conclusion

The present research has examined whether risk propensity as a sixth personality trait contributes to the FFM, explaining entrepreneurial intention. Significant results for risk propensity are found, which means that risk-seeking individuals score higher on entrepreneurial intention. The same results are found for the association between risk propensity and entrepreneurial orientation. Nevertheless, the results also indicate that risk propensity is already incorporated in the FFM, since all the effects of the Big Five personality traits disappear when risk propensity is added to the model. Therefore, risk

propensity will not be considered as a sixth personality trait of the Big Five in explaining entrepreneurial intention. Finally, risk propensity consists of multiple dimensions. By examining the effect of these dimensions on entrepreneurial intention separately, the dimensions that are already incorporated in the FFM and the dimensions that could be an addition to the model can be determined.

Further, by adding interaction terms of optimism and the Big Five personality traits, the present research examines changes in the effect of the Big Five personality traits on entrepreneurial intention, for individuals with different levels of optimism. Since literature suggested that positive emotional states stimulate entrepreneurial intentions, optimism is expected to positively moderate the effects of the Big Five personality traits on entrepreneurial intention. No evidence was found for a moderating effect of optimism. None of the interaction terms between optimism and the Big Five personality traits were significant, regarding the effect on entrepreneurial intention. This might be due to the relation of optimism with four the Big Five personality traits. As optimism is a more specific trait, it therefore can be concluded that it is already incorporated in the FFM as well.

6.1 Limitations

The present research is subject to some limitations. First, the small sample size could account for a large part of the variation, as is the case with many studies regarding personality and entrepreneurship. A small sample size usually leads to larger standard errors, especially when many variables are being included in the model. Low standard errors implicate a more accurate reflection of the actual population mean, meaning the model is more accurate. Larger samples are suggested for further research. Second, the sample consists only of individuals that are students at the Erasmus University Rotterdam. This means it only includes a specific age group, but it is not representative for this age group as a whole. For example, Turker & Selçuk (2009) found that entrepreneurial intention is influenced by different factors for students, than for other people within the same age group. As a suggestion for further research, different sub groups are recommended to be made, in order to examine possible changes in results. Third, since the dataset only measures the scores of individuals on one single point in time, causality cannot be concluded. Furthermore, personality changes over time (Scollon & Diener, 2006) and even during adulthood (Robins, Fraley, Roberts, & Trzesniewski, 2001). Also, there is no evidence that entrepreneurial intention is stable over time. This could result in biased effects of personality traits on entrepreneurial intention. Therefore, for further research, a longitudinal study is recommended. Fourth, the present research focuses on general personality traits. It would be more useful to examine the effects of specific traits on entrepreneurial intention, since general traits include many different sub-factors. For example, internal locus of control and perceived behavioral control could result in a more specific effect on

entrepreneurial intention (Ajzen, 2002). Further, as mentioned before, a more specific part of risk propensity could be added to the model in order to find an addition to the FFM. Fifth, due to the limited size of the dataset, it is not possible to include many control variables. In order to test for the effect of personality traits, it is important to control for as many external factors as possible. For example, entrepreneurial education could affect entrepreneurial intention as well (Liñán, Rodriguez-Cohard, & Rueda-Cantuche, 2011; Zhang, Duysters, & Cloodt, 2014).

6.2 Implications

Knowing what drives individuals to become an entrepreneur is the main subject of research on psychology and entrepreneurship. By determining these drives, policy makers can anticipate on upcoming entrepreneurs and stimulate the environment more efficiently, in order to encourage entrepreneurship. The development of new businesses is crucial for economic growth (Van Praag & Versloot, 2007).

The present paper contributes to the existing literature by examining whether the Big Five personality traits and several sub-factors contribute to entrepreneurial intention, for a specific, young sample of students. Since risk propensity is found to be strongly associated with entrepreneurial intention, explaining entrepreneurial intention could be more accurate when models are based on risk attitude rather than personality traits. Furthermore, no studies on heterogeneity among individuals by adding a moderation analysis seem to be available. Unless the results for the heterogeneity research are not significant, this approach could lead to interesting results when used with more specific psychological traits, or, for example, a larger dataset. These suggestions will be further discussed in the next section.

Finally, the results have practical implications for the choice of self-employment, and for training and educational purposes. People who are willing to take more risk could enjoy working as an entrepreneur more, for example. Individuals that are open to new experiences, seem to have higher levels of entrepreneurial intention and entrepreneurial orientation. The same goes for conscientious and extravert people, and for those who have relatively low levels of agreeableness and neuroticism. According to the results of the present research, the ideal personality profile of the entrepreneur seems to be someone who is curious and creative, efficient and organized, sociable and active. Further, the entrepreneurial person is likely to be less modest and altruistic, as well as emotionally stable. Optimism does not directly play a large role in the profile of a typical entrepreneur, but can be measured indirectly by the mentioned personality characteristics.

By signalling the personality traits that make an entrepreneur earlier, the individual's education and training can be adjusted in order to stimulate entrepreneurial intention and performance.

Individual-level research on the effect of personality traits on entrepreneurial intention and orientation can be used in education, for example in assignments and team projects. Also, it can determine educational training for career choices (Langkamp Bolton & Lane, 2012). Further, a valid measurement for entrepreneurial intention and orientation could be used by investors to examine business proposals and make investment decisions. The findings suggest that risk propensity plays a large role in the entrepreneurial profile, which could indicate that investing in new businesses lead by unexperienced entrepreneurs, is likely to be a high-risk investment.

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Appendix 1: Scale items for the Big Five, risk propensity, optimism, EI, EO, and entrepreneurial parents

Big Five (McCrae & Costa, 1991)

Nederlands	English
1 = Helemaal niet van toepassing, 5 = Helemaal wel van toepassing	1 = Strongly disagree, 5 = Strongly agree
Ik ben iemand die…	I am someone who…
Hartelijk / een gezelschapsmens is	Is outgoing, sociable
Veel enthousiasme opwekt	Generates a lot of enthusiasm
Doorgaans stil is	Tends to be quiet
Terughoudend is	Is reserved
Mensen over het algemeen vertrouwt	Is generally trusting
Geneigd is kritiek te hebben op anderen	Tends to find fault with others
Koud en afstandelijk kan zijn	Can be cold and aloof
Soms grof tegen anderen is	Is sometimes rude to others
Dingen efficiënt doet	Does things efficiently
Grondig te werk gaat	Does a thorough job
Plannen maakt en deze doorzet	Makes plans and follows through with them
Geneigd is lui te zijn	Tends to be lazy
Gemakkelijk zenuwachtig wordt	Gets nervous easily
Zich veel zorgen maakt	Worries a lot
Somber is	Is depressed, blue
Ontspannen is, goed met stress kan omgaan	Is relaxed, handles stress well
Waarde hecht aan kunstzinnige ervaringen	Values, artistic, aesthetic experiences
Benieuwd is naar veel verschillende dingen	Is curious about many different things
Een levendige fantasie heeft	Has an active imagination
Scherpzinnig / een denker is	Is ingenious, a deep thinker
Weinig interesse voor kunst heeft	Has few artistic interests

Risk propensity

Nederlands	English
1 = Sterk mee oneens, 5 = Sterk mee eens	1 = Strongly disagree, 5 = Strongly agree
Ik houd ervan om ongewone plekken te verkennen	I would like to explore strange places
Ik word rusteloos wanneer ik te veel tijd in huis doorbreng	I get restless when I spend too much time at home
Ik vind het leuk om dingen te doen die misschien wel een beetje beangstigend zijn	I like to do frightening things
Ik houd van wilde feesten	I like wild parties
Ik ga het liefste op reis zonder van tevoren precies de route en verblijfplaatsen uit te stippelen	I would like to take off on a trip with no pre-planned routes or timetables
Ik ga het liefst om met mensen die onvoorspelbaar zijn	I prefer friends who are excitingly unpredictable
Ik zou het leuk vinden om een keer te kunnen bungy-jumpen	I would like to try bungee jumping
Ik houd ervan om nieuwe en spannende dingen mee te maken, ook al zijn dat dingen die verboden zijn	I would love to have new and exciting experiences, even if they are illegal

Optimism

Nederlands	English

1 = Helemaal mee oneens, 5 = Helemaal mee eens	1 = Strongly disagree, 5 = Strongly agree
Op momenten van onzekerheid en twijfel, heb ik toch meestal de beste verwachtingen.	In uncertain times, I usually expect the best.
Ik kan me gemakkelijk ontspannen.	It's easy for me to relax.
Als er iets in mijn leven mis kan gaan, dan gaat het ook mis.	If something can go wrong for me, it will.
Ik ben altijd optimistisch over mijn eigen toekomst.	I'm always optimistic about my future.
Ik kan mijn vrienden veel plezier geven.	I enjoy my friends a lot.
Het is belangrijk voor mij actief te blijven.	It's important for me to keep busy.
Ik verwacht eigenlijk nooit dat de dingen zullen lopen zoals ik graag zou willen dat ze lopen.	I hardly ever expect things to go my way.
Ik raak niet snel opgewonden.	I don't get upset too easily.
Ik reken er meestal niet op dat mij iets goeds zal overkomen.	I rarely count on good things happening to me.
Over het algemeen verwacht ik dat me meer goede dingen dan slechte dingen zullen overkomen.	Overall, I expect more good things to happen to me than bad.

Entrepreneurial intention (Linan & Chen, 2009)

Nederlands	*English*
1 = Erg mee oneens, 7 = Erg mee eens	1 = Strongly disagree, 7 = Strongly agree
Ik ben bereid er alles aan te doen om ondernemer te zijn.	I am ready to do anything to be an entrepreneur.
Mijn professionele doel is om ondernemer te worden.	My professional goal is to become an entrepreneur.
Ik zal er veel moeite voor doen om mijn eigen bedrijf te starten en te leiden.	I will make every effort to start and run my own firm.
Ik ben vastbesloten in de toekomst een bedrijf te starten.	I am determined to crate a firm in the future.
Ik heb serieus nagedacht over het starten van een bedrijf.	I have very seriously thought of starting a firm.
Ik wil later graag een bedrijf starten.	I have the firm intention to start a firm someday.

Entrepreneurial Orientation (Langkamp Bolton & Lane, 2012)

Nederlands	*English*
1 = Helemaal mee oneens, 5 = Helemaal mee eens	1 = Strongly disagree, 5 = Strongly agree
Ik onderneem graag gewaagde activiteiten door me op onbekend terrein te begeven.	I like to take bold action by venturing into the unknown
Ik ben bereid om veel tijd en/of geld te investeren in iets dat veel zou kunnen opleveren.	I am willing to invest a lot of time and/or money on something that might yield a high return
Ik heb de neiging om durf te tonen in risicovolle situaties.	I tend to act "boldly" in situations where risk is involved
Ik houd ervan om vaak nieuwe dingen te proberen die afwijkend, maar niet noodzakelijk riskant zijn.	I often like to try new and unusual activities that are not typical but not necessarily risky
In mijn werk geef ik over het algemeen de voorkeur aan een unieke werkwijze in plaats van beproefde methoden.	In general, I prefer a strong emphasis in projects on unique, one-of-a-kind approaches rather than revisiting tried and true approaches used before
Bij het leren van nieuwe dingen geef ik de voorkeur aan mijn eigen aanpak in plaats van het te doen zoals iedereen het doet.	I prefer to try my own unique way when learning new things rather than doing it like everyone else does
Ik ben voorstander van een experimentele en originele aanpak bij het oplossen van problemen in plaats van methoden die anderen over het algemeen gebruiken.	I favour experimentation and original approaches to problem solving rather than using methods others generally use for solving their problems

Ik houd meestal rekening met toekomstige problemen, behoeften of veranderingen.	I usually act in anticipation of future problems, needs or changes
Ik heb de neiging om vooruit te plannen in mijn werk.	I tend to plan ahead on projects
In mijn werk neem ik liever het voortouw en zet zaken in gang dan dat ik een afwachtende houding aanneem.	I prefer to "step-up" and get things going on projects rather than sit and wait for someone else to do it

Entrepreneurial parents

Nederlands	*English*
Hebben je ouders momenteel een eigen bedrijf?	Do your parents own a firm at the moment?
1 = Nee	1 = No
2 = Ja, vader	2 = Yes, my father
3 = Ja, moeder	3 = Yes, my mother
4 = Ja, beide	4 = Yes, both

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
	EI	EI	EI	EI	EI	EI	EI	EI	EI	EI	EI	EI	EI	EI	EI
Parents		0.08**	0.06*	0.08**	0.06*	0.08**	0.09**	0.08**	0.08**	0.08**	0.07*	0.07*	0.06*	0.06*	0.06*
		(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Openness	0.08***	0.07***	0.04	0.07***	0.04	0.00	0.08***	0.08***	0.07***	0.07***	-0.10	0.04	0.04	0.03	0.04
	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.14)	(0.02)	(0.02)	(0.02)	(0.02)	(0.14)	(0.03)	(0.03)	(0.03)	(0.03)
Conscientiousness	0.05**	0.04	0.04*	0.04	0.05*	0.04	-0.09	0.04	0.04	0.04	0.05*	-0.11	0.05*	0.05*	0.05*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.16)	(0.03)	(0.03)	(0.03)	(0.03)	(0.15)	(0.03)	(0.03)	(0.03)
Extraversion	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.11	0.02	0.02	0.01	0.01	0.11	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.13)	(0.02)	(0.02)	(0.02)	(0.02)	(0.13)	(0.02)	(0.02)
Avg. Agreeableness	-0.07*	-0.06*	-0.05	-0.06*	-0.05	-0.06*	-0.07*	-0.06*	-0.04	-0.06*	-0.05	-0.06	-0.05	0.04	-0.05
	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.22)	(0.04)	(0.03)	(0.03)	(0.03)	(0.22)	(0.03)
Neuroticism	-0.04**	-0.04**	-0.03*	-0.04*	-0.04	-0.04*	-0.04*	-0.04*	-0.04*	-0.00	-0.03	-0.03	-0.03	-0.04	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.11)	(0.02)	(0.02)	(0.02)	(0.02)	(0.11)
Risk Propensity			0.44***		0.45***						0.47***	0.46***	0.45***	0.46***	0.45***
			(0.14)		(0.14)						(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Optimism				0.00	-0.01	-0.07	-0.14	0.10	0.01	0.03	-0.16	-0.19	0.09	0.01	0.01
				(0.03)	(0.03)	(0.15)	(0.17)	(0.14)	(0.06)	(0.10)	(0.15)	(0.17)	(0.14)	(0.05)	(0.10)
Openness * Optimism						0.02					0.04				
						(0.04)					(0.04)				
Conscientiousness * Optimism							0.04					0.05			
							(0.05)					(0.05)			
Extraversion * Optimism								-0.03					-0.03		
								(0.04)					(0.04)		
Avg. Agr. * Optimism									-0.01					-0.03	
									(0.06)					(0.06)	
Neuroticsm * Optimism										-0.01					-0.01
										(0.03)					(0.03)
Constant	0.09	0.12	-0.03	0.11	0.01	0.36	0.57	-0.23	0.09	0.01	0.50	0.57	-0.36	-0.05	-0.04
	(0.16)	(0.16)	(0.16)	(0.20)	(0.19)	(0.54)	(0.59)	(0.52)	(0.25)	(0.36)	(0.52)	(0.57)	(0.50)	(0.24)	(0.35)
Observations	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
R-squared	0.16	0.18	0.24	0.18	0.24	0.19	0.19	0.19	0.18	0.19	0.25	0.25	0.24	0.24	0.24
Adjusted R-squared	0.126	0.151	0.202	0.145	0.198	0.140	0.143	0.142	0.139	0.139	0.198	0.198	0.195	0.193	0.192

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1