A Longitudinal Study on the Relationship Between Personality Traits and Entrepreneurial Intention in Uncertain Times

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Abstract

The recent COVID-19 pandemic has seen many people become unemployed, switch jobs, or change the way they were working. While previous studies looked at the impact of crises and disasters on entrepreneurial activity, not much is known yet about the impact of the COVID-19 pandemic on entrepreneurship and entrepreneurial intention. This study aims to address this gap by looking at how different personality traits relate to people's entrepreneurial intentions during the pandemic. This study is based on two surveys conducted among university students: the first survey was conducted in April-May 2020, while the follow-up survey was conducted in December 2020. Multinomial logistic regressions were run to check for the association of optimism, impulsivity and self-efficacy with entrepreneurial intention. First, results show that optimism and impulsivity had no relationship to entrepreneurial intention. However, self-efficacy had a strong positive link with individuals' intentions in these two surveys. Second, results show that optimism and self-efficacy had a positive association with the change in individuals' intention between the two surveys, while impulsivity showed no relationship. For future research, I would suggest focusing on the association of other personality traits, such as risk-taking, extroversion and neuroticism with entrepreneurial intention.

Keywords: COVID-19 pandemic, entrepreneurship, entrepreneurial intention, personality trait, optimism, impulsivity, self-efficacy

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Introduction

Two years ago, everyone's life changed unexpectedly. In December 2019, an outbreak of a disease with pneumonia symptoms was reported in Wuhan, Hubei Province, China (She et al., 2020). The sudden emergence and unforeseen spread of the SARS-CoV-2 led to the scenario where everyone had to deal with uncertainty differently than before. Studies show that the pandemic was associated with decreased mental health and increased anxiety (Adams-Prassl et al., 2020; Huang & Zhao, 2020). The unprecedented lockdowns, closed borders, overloaded hospitals, and lost jobs affected both the social and economic side of life and made people wonder what might come next. People had to work from home, or some could not even work during the pandemic or at least during some pandemic phases (Fernandes, 2020). The hospitality and travel sectors have been hit particularly hard by the lockdowns, losing more than 90% of their activity. However, not only these sectors were affected, but the majority of lost jobs have been in industries which have low average wages. Moreover, unemployment rates were increasing throughout the globe, and more and more people were forced to close their businesses due to the lockdowns and the low number of customers. (Center on Budget and Policy Priorities, 2021).

The uncertainty unquestionably also affected entrepreneurship and the process of decision making throughout all the stages of the entrepreneurial activity. As mentioned in the paper by Belitski et al. (2021), the COVID-19 pandemic did abolish small business jobs and created more creative and productive entrepreneurship initiatives. This led to the situation in which individuals had to rethink their already existing businesses or adjust their plans to survive the changes caused by the customers' demand. This is also in line with the findings of Lopes et al. (2021), who concluded that businesses' closure led to more entrepreneurship initiatives and innovation. This, in turn, can have two reasons; first, it is either the fact that more people were losing their jobs, hence feeling pressured to come up with new alternatives. Thus, entrepreneurship can be seen more as a necessity in this scenario. The second reason is that people had more time to spend at home, which increased their imagination and creativity for new ideas. In this scenario, entrepreneurship is more opportunity-driven. However, as Vaz-Curado and Mueller (2019) mentioned, after all, in both scenarios, entrepreneurship is about finding opportunities and taking advantage of them.

Personality traits reflect individuals' characteristic patterns of thinking, feeling and behaving. These traits influence our behaviour throughout many situations. Also, personality traits

imply consistency and stability in people's behaviour. It is believed that people differ from each other in terms of where they stand on basic trait dimensions that persist over time and in situations (Diener & Lucas, 2019).

The role of personality traits in the decision-making process and successful business leading has been discussed for a long time in entrepreneurship research. Entrepreneurs have unique personalities; this makes them entrepreneurs (Gartner, 1988). Previous studies have also acknowledged the importance of individuals' personality traits for entrepreneurial intentions. Moreover, studies have focused on education (Fayolle & Gailly, 2005; Kolvereid & Moen, 1997; Noel, 2002) or demographics to explain one's choice and preference to focus on entrepreneurship. Prior research has concluded that entrepreneurial intentions among students can be influenced and guided by both personal and environmental factors. This means that people's, mainly students', perceptions about intending to start a new business can easily change over time. Moreover, entrepreneurial education or motivation can guide students' intentions for increased entrepreneurial activity. This aspect confirms the relevance and importance of studying the relationship between personality traits and entrepreneurial intention. Some studies look at these relationships during various crises, but the number of studies about entrepreneurship and entrepreneurial intentions during pandemics remains scarce.

Most individuals are overconfident about their own abilities and maybe too optimistic about their futures (Weinstein, 1980). At the same time, unusual situations test individuals' skills. This is why it is essential to look at how advantageous personality traits for entrepreneurial intentions are related to the decision-making process in the exceptional times of the pandemic.

Specifically, this paper will focus on three characteristics that are believed to influence the change in entrepreneurial intentions, namely optimism, impulsivity and self-efficacy. Thus, this study will try to answer the following research question:

Do different personality traits associate with entrepreneurial intention and change in entrepreneurial intention during the COVID-19 pandemic?

To answer this research question, a sample of students will be analysed. The dataset that is used contains responses regarding students' personality traits and intentions of starting new businesses and their preference for being employed against the option of being self-employed

during two different phases of the COVID-19 pandemic. First, the relationship between optimism, impulsivity, self-efficacy and entrepreneurial intention will be assessed during the pandemic. Moreover, the relationship between these personality traits and changes in entrepreneurial intention during the pandemic will be assessed. To be able to evaluate this relationship, multinomial logistic regressions will be run. To test whether the results are robust, robustness checks will be run. To do this, again, logistic regressions and multinomial logistic regressions will be run.

This thesis helps to increase our understanding of how individuals' personalities are associated with their intention to start a new firm in a highly uncertain period of time, as the pandemic is a good background setting for this. Also, this study addresses the gap between personality traits and the potential change in entrepreneurial intention due to the high degree of risk and uncertainty. The thesis' topic is relevant for several reasons. First, the COVID-19 pandemic came with a large amount of uncertainty. The concern of a post-pandemic life is affecting all of us. Also, everyone already understood that life would never be the same as before, and establishing a new way of living is essential, even if it takes more adaptation. Second, testing entrepreneurial intentions is relevant because, as Ajzen (1985) mentioned, an individual's decision to engage in a specific behaviour can be predicted by their intention to engage in that behaviour. Third, using a sample of university students is reasonable, as millennials want to shape their own future, which can be done through entrepreneurship. Also, it is interesting to study whether the number of students interested in entrepreneurial activity changed or not during the pandemic. Thus, overall, this study aims to understand the effect of this socio-economic crisis by looking at how COVID-19 changed entrepreneurial intentions.

Regarding the results, this study shows that optimism and impulsivity do not associate with an individual's intention to start a new firm. These results are not in line with our expectations. However, we observe that self-efficacy is positively related to entrepreneurial intention. This relation was expected.

Second, in line with our expectations, optimism and self-efficacy have a positive and significant relationship with the way people changed their opinion about starting a new firm. Additionally, impulsivity does not relate to the way individuals changed their perception about starting a new business. This finding about impulsivity is, again, contrary to our expectations.

Running the robustness check, this confirms to us that the results are robust for entrepreneurial intentions and are not dependent on the variables and methods used. Still, the results of the robustness check show that optimism is associated with a change in entrepreneurial intention. This association that was not shown in the case of the main analysis. This might be explained because, although self-employment describes entrepreneurial intention, it is not a perfect fit for it.

The study is structured as follows. First, the relevant literature on entrepreneurship, entrepreneurial intention and personality traits will be presented. Based on the gaps found in the literature, hypotheses will be developed. Second, the data and methods used for the study are presented. Next, the results of the statistical tests concerning the hypotheses and robustness check are described. Lastly, conclusions are drawn and discussed, followed by the limitations and the suggestions for further research.

Theoretical Framework

In this part of the study, the existing literature will be presented. First, literature on entrepreneurship will be presented. Second, the connection between entrepreneurial intention and entrepreneurship will be discussed. Third, crises and disasters and their impact on entrepreneurship will be discussed. Fourth, the COVID-19 pandemic will be presented, and the pandemic's impact on entrepreneurship, as well as the role of personality traits on this impact. Finally, the chapter will end with the presentation of the study's hypotheses.

Entrepreneurship

In this part, the importance of entrepreneurship for economic development will be presented, along with different types of entrepreneurship that might develop under different circumstances.

Entrepreneurship is one of the main factors contributing to economic development and innovation, a less volatile labour market, job creation, and customers' new demand satisfaction (Acs & Audretsch, 2005; Meyer & Meyer, 2017; Van Praag & Versloot, 2007). Schumpeter (1934), in his work, *The Theory of Economic Development*, pointed out that entrepreneurs are the main drivers of economic development. Schumpeter believes that innovations and the growth of

economic activity is are merits of entrepreneurs. Meyer and de Jongh (2018) found that economic growth, development, and entrepreneurship are connected. They found that the economic and social environments are also improving in countries where the entrepreneurial setting is advancing. They also found that entrepreneurship plays a crucial role in innovation.

Additionally, there is a distinction between starting a business only because of the observed opportunity and this opportunity's exploitation and starting a business because of the lack of alternatives. For this, there are two types of entrepreneurship: opportunity-driven and necessity-driven. In his study on entrepreneurial activity, Autio (2007) found a difference between the orientation of entrepreneurial activities across countries. The study done by Autio shows that there is a high level of necessity-driven entrepreneurial activity in low-income countries, whereas in high-income countries, this type of entrepreneurial activity is virtually non-existent. In the latter case, nearly all entrepreneurial activity is opportunity-driven.

Furthermore, studying eleven countries, Acs and Varga (2005), found that opportunity-driven entrepreneurship has a positive and significant effect on economic development while necessity-driven entrepreneurship has no effect. Fairlie and Fossen (2018) define individuals who are unemployed before starting businesses as necessity entrepreneurs, while they define individuals who are not unemployed before starting businesses as opportunity entrepreneurs. However, according to Fossen and Büttner (2013), even if students are not employed, they are considered opportunity-driven individuals if they start a business after graduating.

To conclude, in this paper, entrepreneurship will entail both necessity and opportunity-driven entrepreneurial activity, as the difference at the level of university students is less distinct.

Theory of Planned Behaviour – Entrepreneurial Intention

In this part of the thesis, the link between entrepreneurship and entrepreneurial intention will be presented, as well as the reasoning why intention is an effective measure for entrepreneurial activity.

Two theoretical frameworks are essential to mention in this paper. The first one is Ajzen's (1985) theory of planned behaviour (TPB), and the second is Shapero's (1975) model of the entrepreneurial event (SEE). In the TPB, Ajzen concluded that assessing an individual's intention is meaningful as an individual's decision to engage in a specific behaviour can be predicted by their intention to engage in that behaviour. The theory argues that intention depends on social

norms, which correspond to the social pressure to perform certain behaviours, attitudes towards behaviour, and self-efficacy, which corresponds to individuals' self-assessment of the needed skills to perform certain behaviours (Ajzen, 1985). On the other hand, in the entrepreneurial event model, Shapero (1975) determined that the entrepreneurial intention depends on an individual's perceived desirability and feasibility of the event and the individual's propensity to act.

In their paper, Krueger et al. (2000) describe entrepreneurship as a way of thinking that emphasizes opportunities over threats. They believe that the process of identifying opportunities is intentional, meaning that entrepreneurial intentions deserve to be paid attention to. Moreover, conducting a study on the entrepreneurial engagement level, Van der Zwan et al. (2010) showed that entrepreneurial decision-making is a successive engagement level process. Their theory is based on nascent entrepreneurs, individuals who become self-employed but do not own a business yet (Davidsson, 2006). They show that there are certain steps need to be taken to be able to set up a business. Thus, even if it is difficult to make a step from intending to starting a business, once the first steps are taken, it will be more straightforward and more obvious to have a business (Van der Zwan et al., 2010). This means that entrepreneurial intention is a necessary step preceding entrepreneurship, and this theory is in line with the theory of planned behaviour.

In the psychological literature, it was shown that intentions are the best predictors of planned behaviour. The framework of the theory of planned behaviour can be mainly helpful when the action itself is rare, hard to measure or includes time lags. Since new businesses take time to arise and implicate considerable planning, entrepreneurship becomes the type of planned behaviour suitable to be measured by intentions (Krueger et al., 2000).

Thompson (2009) constructed a literature overview to show how entrepreneurial intention can have different definitions and measures. In previous papers, researchers used to refer to related but different concepts. His finding points out that in most studies, entrepreneurial intention refers to nascent entrepreneurs (Carter et al., 1996; Korunka et al., 2003), to business ownership desire (Crant, 1996; Singh & DeNoble, 2003), to self-employment desire (Singh & DeNoble, 2003; Franke & Lüthje, 2004) or career goals (Francis & Banning, 2001). In this paper, entrepreneurial intentions will mainly represent the desire to start a new firm and the orientation towards self-employment.

Thus, this paper focuses on entrepreneurial intention as it is believed that intention is a good predictor of entrepreneurial action itself. It was proven that an individual's intention to start

a new business is a fundamental and widely used metric for researching entrepreneurship (Bird, 1988; Carr & Sequeira, 2007; Krueger et al., 2000; Webster, 1977; Wilson et al., 2007). Also, as this study aims to understand how the pandemic altered the perception about starting a new business of potential future entrepreneurs, studying entrepreneurial intention among students is relevant.

Impact of Crises on Entrepreneurship

In this part the (potential) consequences of crises and disasters on entrepreneurship and entrepreneurial intention will be presented.

Schumpeter (1934) found that the number of entrepreneurs depends not only on the profit that can be made but also on favourable circumstances. This would mean that in environments with a high degree of risk and uncertainty, mostly entrepreneurs that have extraordinary abilities and skills and who can function under pressure, will be able to undertake their innovations. In the context of crises, this means that a large number of people can have innovative ideas. However, it will be more challenging to pursue their business ideas. due to the high pressure. Risk scares away potential entrepreneurs (Schumpeter, 1934). This reasoning serves as a great motivation for this thesis, as a pandemic came with a many uncertainties and risks.

Crises and periods of high unemployment may push individuals toward self-employment as the result of a lack of other opportunities (Dawson & Henley, 2012). Dawson and Henley's study is based on push and pull entrepreneurship. On the one hand, push entrepreneurs are individuals who are not satisfied with their positions, and this dissatisfaction pushes them to start a new business. On the other hand, pull entrepreneurs are individuals who have new business ideas and are lured by the attractiveness of these ideas to start a new business (Amit & Muller, 1995). Dawson and Henley found that individuals' decisions about self-employment changed in times of the recessionary economy. Thus, in times of recession, individuals who are not able to find appropriate paid employment will choose self-employment, even if the conditions for this are less desirable.

As there is limited literature available on the effect of pandemics on entrepreneurship, we first address alternative types of crises', such as terrorist attacks and wars, natural disasters and economic crises' impact on entrepreneurship.

First, Gaibulloev and Sandler (2009) examined the impact of terrorism and conflict on income per capita growth in Asia between 1970 and 2004. They found that economic consequences are experienced mainly by developing countries and less by developed countries. In their paper about the cost of conflict on the economy, Abadie and Gardeazabal (2003) showed that after the outbreak of the terrorist act in the Basque Country in the late 1960s, the per capita gross domestic product declined compared to a region without terrorism. Moreover, in case only a small portion of the stock of capital of a country is affected by a disaster, the disaster is not expected to significantly affect the economy (Becker & Murphy, 2001). Becker and Murphy found this relevant for the terrorist attack on September 11th, 2001. This idea was supported by Mill (1848), who believed that as long as the economy's primary engine, knowledge and skills of the population, is only slightly affected, there is no reason to think that the economy will not recover quickly. Mill's idea was supported by examples of natural disasters or terrorist attacks, which are focused on limited locations.

Second, in the case of natural disasters, it was confirmed that the human response to such disasters could aggravate its impact more than the event itself (Kates et al., 2006). Neumayer et al. (2014) found that these types of disasters tend to cause more damage when a relatively significant hazard hits an area where hazards are historically not frequent or tend to be of low strength and intensity. The reason for this is that if individuals are not prepared, it may take additional time to repair the damage.

Third, in the case of the 2008 economic crisis, Vegetti and Adăscăliţei (2017) found that the crisis had a negative impact on individuals' entrepreneurial attitudes and intentions. Moreover, Vegetti and Adăscăliţei (2017) found that after the economic crisis, early-stage entrepreneurship dropped, which means that the crisis not only brought economic stagnation, but it also reduced the means by which the stagnation might have been overcome. However, in countries where the borrowing conditions were better, the recession did not have a significant negative effect on early entrepreneurship. These findings suggest that overcoming the drawbacks caused by economic crises depends on the current economic conditions, such as the interest rates on loans or the willingness of the banks to support businesses.

COVID-19 Pandemic

Borio (2020) mentions that the COVID-19 pandemic had some unique characteristics, from which two are essential to mention here. First, the consequences were truly uncertain, meaning that the economic possibilities were dependent on non-economic factors. Second, it was global, meaning that all the countries were experiencing it. These two characteristics are the main reason why a pandemic should be considered and analysed separately from other disasters.

In December 2019, an outbreak of a disease with pneumonia symptoms was reported in Wuhan, China. This turned out to cause the next pandemic. This pandemic brought many disruptions worldwide, with business operations being reduced or dramatically shifted, or even disrupted (Alao & Gbolagade, 2020). These massive changes led to a decrease in the number of active business owners by 2% from February to April 2020 (Fairlie & Fossen, 2021). Thus, the COVID-19 pandemic increased the level of uncertainty experienced by people. This can be seen already by the increased level of perceived risk and uncertainty regarding starting a new business due to the lockdowns (Bartik et al., 2020; Cepel et al., 2020). As defined by Knight (1921), uncertainty involves unknown outcome possibilities and unknown probabilities of these possibilities. The high risk of uncertainty affects the business owners but also individuals who are in the first stages of developing new business ideas (Bartik et al., 2020).

Impact of Pandemic on Entrepreneurship and Entrepreneurial Intention

Although there are studies on the relation between the perception and behaviour of people during wars, terrorism or natural disasters, there are not yet many papers conducted for results during pandemics.

Linan and Jaen (2020) conducted a study on the consequences of the pandemic on entrepreneurship and new venture activity. As this study was conducted at the beginning of the pandemic, the results showed the expectation of a potentially quick recovery of the entrepreneurial activity. It was expected that the necessity-driven entrepreneurship would have to boom. It was hoped for a quick recovery.

Lungu and Bogoslov (2020) investigated the key factors that led to the success of well-known companies during the pandemic. The first determinant is realizing that bearing a higher risk can also lead to a higher profit. To be able to deal with all the challenges, already established

businesses had to rethink their strategy. Having to rethink the strategy of the entrepreneurial action and considering new ideas to supply customers' adjusted needs has usually led to the appearance of many new businesses in a short period of time. This also implies the second determinant, the ability to adapt to the new demands of customers. Thus, businesses that managed to adapt quickly managed to make great profits. All these determinants also apply to individuals. Individuals who decided to take greater risks by satisfying the new demands by establishing new businesses during the pandemic were also the individuals who had to gain from these challenging times (Lungu & Bogoslov, 2020).

In conclusion, if entrepreneurs and owners of already existing businesses decided to continue without rethinking their strategies, these individuals probably had less success due to the pandemic. If adapting of the previous strategies or developing new ideas was possible, then the pandemic could have served as the base of success.

The Role of Personality Traits

This part of the thesis will present the importance of different personality traits for entrepreneurship and entrepreneurial intentions. Moreover, their relationship to change in entrepreneurial intention during the pandemic will be described. Also, the thesis' hypotheses will be proposed.

Gartner (1988) defined the trait approach in his study on entrepreneurs. In the trait approach, entrepreneurs are believed to have a particular personality type. Moreover, individuals who were once entrepreneurs will always aspire to be entrepreneurs since being an entrepreneur is seen as personality type. Previous studies concluded that personality traits play a crucial role in explaining entrepreneurial intentions and entrepreneurial activity (Baum & Locke, 2004; Collins et al., 2004, Zhao et al., 2010).

Optimism. Caver et al. (2010) defined *optimism* as an individual's trait that reflects how individuals hold generalized favourable expectations of their future. Peterson (2000) concluded that, over time, optimism had been linked to many positive outcomes, such as positive mood and positive morale, as well as perseverance and effective problem solving, academic and occupational success, or even to long life and freedom from trauma. In their research, Kleiman et al. (2017) found that optimism and positive expectations are associated with fewer depressive episodes in stressful and anxiety full life periods.

Previous studies showed that optimism is positively correlated with entrepreneurial intentions (Baluku et al., 2019; Madar et al., 2019), while Dushnitsky concluded that optimism could be an actual requirement for entrepreneurship (Dushnitsky, 2010).

Previous studies on entrepreneurship indicate that entrepreneurs are optimistic about their own abilities and future prospects (Busenitz & Barney, 1997, Camerer & Lovallo 1999). Ozaralli and Rivenburgh (2016), using a sample of students from the United States and Turkey, showed that there was a significant effect of optimism on entrepreneurial intentions.

In her study, Trevelyan (2008) examines the two elements of confidence: optimism and overconfidence. In this study, the sample is constructed of Australian entrepreneurs in different stages of the new venture development process. This study shows that both optimism and overconfidence are beneficial for individuals when deciding to become an entrepreneur; however, overconfidence can be harmful when deciding to react to setbacks.

As the previous literature suggests, we also expect optimism to have a positive link with an individual's entrepreneurial intention assessed during the COVID-19 pandemic. Therefore, the following hypothesis will be tested:

Hypothesis 1a: *Optimism is positively related to students' entrepreneurial intentions during the pandemic.*

Optimistic individuals remember easier the positive outcomes compared to the negative ones and manage to keep high hopes about the future even when experiencing challenges. Gibson and Sanbonmatsu (2004) conducted three studies to check for downside in optimism. The researchers chose the setting of gambling. After the first study, it was visible that optimists, more likely than pessimists, maintain positive gambling expectations even after losses. In the second study, it was shown that pessimists reduce their betting after a poor performance. In contrast, the third study imitated this effect by using a more controlled experiment and showed that optimists reported remembering more recent wins than pessimists after losses.

Following this, Rasmussen et al. (2006) conducted a study to examine the relationship between optimism and an individual's ability to disengage from their goal and re-engage to a new goal. This study showed that when the goals are perceived as unattainable, optimist individuals do not find it easier to disengage from those goals than their pessimist counterparts. However, it is

easier for optimist people to find new goals and pursue them. Being able to re-engage easier could be an advantageous quality for entrepreneurs, as the unexpected pandemic challenged all the ideas and required adjustments for the survival of these ideas.

Importantly, optimist individuals also promote persistence (Litt et al., 1992; Seligman & Schulman, 1986) and commitment (McColl-Kennedy & Anderson, 2005). When entrepreneurs are optimists, this trait helps them minimize uncertainty and overcome setbacks easier. This means that during the caused setbacks of the pandemic, individuals with an entrepreneurial spirit can better overcome the challenges compared to more pessimist individuals.

When facing great uncertainty and risk, optimistic individuals believe more in their ideas (Ucbasaran et al., 2010), thus being better at establishing new ventures even under high pressure. In the context of the pandemic, this means that more optimistic individuals will be more likely to pursue their entrepreneurial inspirations compared to fewer optimistic individuals.

Based on the above-presented literature, we expect that it would be easier for optimistic individuals to face the challenges during the pandemic. Also, it is expected that optimistic individuals, have an easier transaction to re-engaging and adapting their ideas thus we expect a positive association between optimism and change in entrepreneurial intention:

Hypothesis 1b: *Optimism is positively related to the change in students' entrepreneurial intentions during the pandemic.*

Impulsive personality. Acting under uncertainty and quickly engaging in action before the opportunities are gone are crucial aspects of entrepreneurship (Knight, 1921; McMullen & Shepherd, 2006; Shane & Venkataraman, 2000; Wiklund et al., 2018). Moeller et al. (2001) define impulsivity as a predisposition toward rapid, unplanned reactions to internal or external stimuli without considering the negative consequences of these reactions to the impulsive individual or others. Also, Eysenck and Eysenck (1977) explained impulsivity as a trait related to risk-taking, lack of planning and liveliness, and ability to quickly up one's mind quickly. Thus, impulsivity is essential to consider in the setting of high uncertainty since impulsive individuals are drawn to highly uncertain times. At the same time, impulsive people also tend to act on and thrive on these highly uncertain moments (Leland et al., 2006). Chamberlain and Sahakian (2007) described

impulsivity as the multitude of behaviours or responses that are poorly conceived, premature, inappropriate, and that frequently result in unwanted outcomes.

Even if there is no universally accepted guideline for which personality traits should be considered negative or positive traits, having negative traits has a bad connotation. Taking this into account, Wiklund et al. (2017) conducted a study to examine the effect of ADHD and impulsivity on entrepreneurship. They found that entrepreneurship is a unique area where traits that are perceived as negative, such as impulsivity, may present added values. The researchers argued this by acknowledging that individuals are required to have a certain speed of action in the entrepreneurial environment, which is favouring impulsive individuals. Also, other studies showed a positive link between impulsivity and entrepreneurship. For example, Richardson (2017), using a sample of students studying entrepreneurship, found that impulsiveness has a positive significant impact on evaluating business opportunities and engaging and progressing in the decision-making process. Also, Pietersen and Botha (2021) argue the advantage of impulsiveness in entrepreneurial behaviour by pointing out that an entrepreneurial opportunity's desirability rather than feasibility help impulsive individuals get involved in the process of starting new businesses. Also, the fact that desirability is preferred over feasibility is critical in situations of high uncertainty.

Based on this literature, we expect impulsivity to have a positive relationship with entrepreneurial intention assessed during the COVID-19 pandemic.

Hypothesis 2a: *Impulsive personality is positively related to students' entrepreneurial intentions during the pandemic.*

Studying entrepreneurial intention and even more studying entrepreneurial intention under uncertainty has been done a lot. However, it is hard to distinguish between people acting impulsively about their entrepreneurial preferences and not having other options to choose from due to the pandemic. It became difficult to distinguish between what people find rational to do and individuals trying to get the best out of the pandemic caused by the economic situation.

As nothing similar to the COVID-19 pandemic has been seen before, this period came with a high degree of fear and anxiety. In their study on impulsivity, Wiklund et al. (2018) focus on the multi-dimensional characteristic of impulsivity. These dimensions include sensation seeking and lack of premeditation. Sensation seeking is about finding pleasure even in difficult moments with

uncertainty, while lack of premeditation signals a high tolerance to uncertainty. The study's findings show that these aspects positively affect on entrepreneurial preferences. Throughout these dimensions, it can be better understood how impulsivity could lead to positive outcomes in the entrepreneurial decision-making process in highly uncertain situations.

There is a strong relationship between impulsive personality and risk-taking (Games et al., 2022). Moreover, Games et al. (2022) showed a significant relationship between impulsive personality and fear of failure. Individuals who are pursuing business growth and better business performances might consider this fear of failure a motivating factor. Thus, in times of uncertainty, when the fear of failure is increased, impulsive individuals could be more likely to take the risk and continue with their intentions, having the fear of failure as extra motivation.

Given the nature of the period the COVID-19 pandemic created, characterized by uncertainty, worry, and tension, this hypothesis will focus on better understanding the relationship between impulsive personality and entrepreneurial intention change.

Hypothesis 2b: *Impulsive personality is positively related to the change in students' entrepreneurial intentions during the pandemic.*

Self-efficacy. The self-efficacy theory refers to an individual's belief in their capability to perform specific tasks and fulfil roles to achieve entrepreneurial outcomes (Chen et al., 1998). The term was first used by Bandura (1977), who suggested the concept to be a personal judgment of "how well can one execute courses of action required to deal with prospective situations". High self-efficacy has been linked with many benefits, such as resilience to adversity or stress, healthy lifestyle habits and educational achievements (Lopez-Garrido, 2020).

At a later point, Bandura (2012) also found that, especially for students, entrepreneurial self-efficacy is the element that affects their motivation and competence to enter the process of new business creation. Kolbe (2009) suggested that believing in your own abilities is crucial in calculating one's cognitive strength.

Previous studies showed that self-efficacy is the most important and strongest factor influencing entrepreneurial intention among students. Also, Pihie and Bagheri (2013) examined the relationship between self-efficacy and entrepreneurial intention. They have done this study with the belief that the mechanism through which self-efficacy influences an individual's

behaviour is unclear but critical, mainly in the area of entrepreneurship. The motivation for this belief was that self-efficacy plays a crucial role in motivating and enabling individuals to start new businesses. They found that, among Malaysian university students, self-efficacy is the main factor that positively influences entrepreneurial intentions (Pihie & Bagheri, 2013). This positive relationship was also found by Bagheri and Lope Pihie (2014) and Dinther et al. (2011). Hollenbeck and Hall (2004) found that self-efficacy is affected by contextual factors, such as the individual's education or past experiences. Bux and van Vuuren (2019) conducted a study among South African young people since the country faced youth unemployment crises. The researchers found that in an area of the immature state of entrepreneurship, self-efficacy may have the most critical impact on intentions.

For undergraduate students, Bagheri and Lope Pihie (2014) found that self-efficacy has a stronger effect on male's entrepreneurial intentions, while Hackett et al. (1992) found that women tend to perceive their level of self-efficacy as lower in stereotypically male areas, which also include entrepreneurship.

The existing literature shows a clear positive relationship between an individual's self-efficacy and entrepreneurial intention. However, the literature in uncertain times is scarce. Based on previous literature, we expect the relationship also to hold during the COVID-19 pandemic:

Hypothesis 3a: *A higher level of self-efficacy is positively related to students' entrepreneurial intentions during the pandemic.*

The literature is limited when looking at how self-efficacy forms and changes entrepreneurial intention during a crisis.

To survive uncertain times, individuals' resilience is tested. This is the case also in the entrepreneurial context. Entrepreneurial resilience and self-efficacy support each other and together affect the entrepreneurs' behaviour and decision-making process (Walsh & McCollum, 2020).

In a study conducted on self-efficacy and entrepreneurial intention in environments with disrupted outcome expectations, self-efficacy proved to be a weaker predictor than in environments with stable outcomes (Bergenholtz et al., 2021). This shows that in times when the

possibilities and their probabilities are not known, self-efficacy may have a weaker association with entrepreneurial intentions.

Self-efficacy is likely to change as a result of repeated negative feedback and challenges. Due to environmental considerations, self-efficacy is more likely to change quickly when faced with environmental changes (De Clercq et al., 2009; Gist, 1992). This suggests that individuals need to be passionate in order to overcome the difficulties experienced by starting a firm and experiencing crises simultaneously (Cardon & Kirk, 2015). The study of Cardon and Kirk (2015) was conducted in the financial crisis setting, a period comparable to the pandemic.

This presented literature shows that the association between self-efficacy and entrepreneurial intention might be smaller but still significant in uncertain times with a high degree of risk. From this, the last hypothesis follows:

Hypothesis 3b: *A higher level of self-efficacy is positively related to the change in students' entrepreneurial intentions during the pandemic.*

Data and Methodology

In this part, the survey's design will be presented, followed by the description of the dependent, independent and control variables used in this study. Next, the descriptive statistics for the variables used will be illustrated. The methods used to test the hypotheses and answer the research question will be discussed in the methodology section. Finally, the variables and methods used for the robustness check will be presented.

Sample

Data was used from the Erasmus University Rotterdam International COVID-19 Student Survey (Wismans et al., 2020; Wismans et al., 2021). This initiative collected data from university students during two-time points during the COVID-19 pandemic. There were 7,404 responses from students from ten countries in the first survey. The first survey was conducted between weeks 17-20 of 2020 (April-May), representing the pandemic's beginning and early stages. However, in the follow-up, only students who indicated that they would like to participate in the follow-up survey were contacted. In the follow-up survey, only students from the Netherlands, Belgium and

Portugal were contacted, as from the other countries, the number of individuals who agreed to be contacted again was too low, which means that the samples from those countries would have been insufficiently large to conduct several statistical tests. In the second survey, there were in the end 1,137 responses. The second survey took place between weeks 51-52 of 2020 (December), a period which already represents a more advanced stage of the pandemic. For this paper, the sample from the second survey was used so that for each individual, there are responses from both surveys. Some of the observations had to be dropped from the sample due to missing value when running the statistical tests. The final sample consisted of 1,124 observations, as eight observations were dropped because the option *other* was indicated for gender, and the sample size was too small for this category. Due to the missing values for variables age and entrepreneurial intention, one observation from each had to be dropped. Due to the missing value for the preference for being self-employed, three observations had to be dropped.

Variable Description

Dependent variables. Two different dependent variables will be used to test the hypotheses in this study. These variables are entrepreneurial intention and the change in entrepreneurial intention. The entrepreneurial intention is measured in both surveys, while the change is calculated with the help of these two variables.

Entrepreneurial intention. Entrepreneurial intention was measured by the individuals' intention to start a firm. In the career aspiration part of both the initial and follow-up surveys, respondents were asked to indicate their level of agreement on whether they have a strong intention to start a firm someday. The respondents could indicate their agreement on a scale from strongly disagreeing (1) to strongly agreeing (7). Therefore, the entrepreneurial scale is a Likert scale. The scale is metric and symmetric (Malhotra, 2006) because the option of neutrality lies exactly in the middle of the scale, with having strongly agree/disagree and agree/disagree on each side. Also, in the surveys provided to the students, the 7-point Likert scale was used. This version can be more precise than the 5-point scale as the availability of more options can enable the independence of participants to pick the exact choice rather than a nearby option (Dawes, 2008). Because there was one missing value in both the first survey and the second survey, which corresponded to the same respondent, this observation was dropped from the survey.

Change in entrepreneurial intention. The change in entrepreneurial intention was measured by examining the difference in response of individuals between the first and follow-up survey. To calculate this difference, categorical variables were created. First, based on the answers from the surveys, each individual was put in a category of either being not interested (options 1, 2 and 3), neutral (option 4) or interested (options 5, 6 and 7) in starting a new firm someday. After doing this, a new variable was created, which looked at whether individuals - during the second survey - stayed not interested, neutral or interested. In Figure 2, the change in the distribution of responses to the statement *I have the strong intention to start a firm someday* from survey 1 to survey 2 is illustrated. This was done by creating three categories: *Not interested*, *Neutral* and *Interested*. These groups were computed as follows: individuals who chose strongly disagree (1), 2 or 3 were assigned to the group *Not interested*; individuals who chose option 4 were assigned to the group *Neutral*; and finally, individuals who chose options 5, 6 or strongly agree (7) were assigned to the group *Interested*. Choosing 4 as the option for neutrality was based on Malhotra's findings (2006). This was done for both survey 1 and survey 2. Table 1 in the Appendix shows that almost the same number chose each group during the two surveys. Combining these two categories, the change of entrepreneurial intention has nine possible groups: *not interested-not interested, not interested-neutral, not interested-interested, neutral-not interested, neutral-neutral, neutral-interested, interested-not interested, interested-neutral* and *interested-interested*.

Independent variables. In this study, three independent variables are expected to influence entrepreneurial intention and the change in entrepreneurial intention, namely optimism, impulsivity and self-efficacy.

Optimism. Optimism is measured by the Revised Life Orientation Test (LOT-R), a survey developed by Scheier et al. (1994). Respondents are asked to indicate how much they agree with the statements about positive and negative future expectations. The survey has ten statements, the answers varying from strongly disagreeing (1) to strongly agreeing (5). To calculate respondents' optimism score, their chosen options were scored from 0 to 4, with 0 standing for strongly disagreeing and 4 for strongly agreeing. The survey has ten statements. However, four are filler statements, so they were dropped when calculating the final score. Three of the remaining seven statements are negatively formulated, leading to the necessity of reversed scoring for these statements when calculating the final score. After the adjustments, the scores from the individual

statements were added up to obtain the optimism score. This score varies from 0 to 24, the higher score representing a more optimistic individual.

Impulsivity. Impulsivity is measured by the shorter and unidimensional version of the Barratt Impulsiveness Scale (BIS-11): the BIS-Brief 8 items survey (Mathias, 2018). The BIS scale is the most commonly used scale for measuring self-reported impulsive traits (Patton, 1995). In this survey, the respondents' impulsive and non-impulsive personality traits are measured, and options vary from Rarely/Never (1) to Almost Always/Always (4). To score the responses, for each individual's answer, corresponding scores were assigned and added up to a total score, with higher scores indicating more impulsiveness. As in the case of the LOT-R, in this survey, four statements are negatively worded, meaning the necessity of reversed scoring for the final score. After the adjustments, the final score can be calculated, ranging from 8 to 32.

Self-efficacy. Respondents' self-efficacy is measured by the General Self-Efficacy Scale (GSES) developed by Schwarzer and Jerusalem (1995). In this survey, ten statements measure the strength of individuals' beliefs about their ability to respond to a difficult situation and deal with drawbacks. The response choice varies from Not true at all (1) to Exactly true (4). The total score is calculated by adding all individual scores of the ten items, scores ranging from 10 to 40, with a higher score indicating more self-efficacy.

Control variables. There are four control variables included in the research: age, country, subject of study, and gender. These are presented below.

Age. Individuals' age is expressed as a continuous variable and was measured by explicitly asking the respondents their age.

Country. The respondent's country of enrolment (country where the university is located) was taken for this variable. In the first survey, there were ten countries, namely the Netherlands, Belgium, Portugal, France, Ireland, Spain, Italy, Sweden, Colombia and India, however in the follow-up, only three countries were included, as there was only a limited number of responses from the other countries. For this reason, the sample of both surveys was limited to the Netherlands, Belgium and Portugal.

Subject of study. The student's current field of study was also included as a categorical variable. There were ten different options from which students could choose, namely: economics/business, psychology, law, philosophy, arts and letters, medicine, sciences (biology,

chemistry, physics, geography, mathematics), agronomy, engineering, computer sciences and a category for other subjects not mentioned in the survey. For this research from the subjects mentioned above, a dummy variable was created, taking the value of 1 if the individual is studying economics or business and 0 otherwise.

Gender. In the question regarding gender, respondents could have chosen from options female, male and other. However, since only 8 participants (0.71% of the sample) chose option other, these observations were dropped from the sample. This means that a dummy variable, which takes the value of 1 for females, and 0 otherwise, was created.

Reliability

To measure the reliability of the scales mentioned above, Cronbach's alpha was calculated for all three measurements. Cronbach's alpha measures the internal consistency of the items and is considered a good measure of the reliability of the Likert scale. Cronbach's alpha ranges from 0 to 1; if the scale items are entirely independent, the alpha is zero. If there is high covariance, indicating that the scale items measure the same concept, alpha is approaching 1.

In Table 1, Cronbach's alpha for optimism, impulsivity and self-efficacy are presented. From these tables, it is readable that the alpha for the three scales is 0.813, 0.749, and 0.854, respectively. These values show that the survey items are internally consistent.

Table 1

Cronbach's Alphas for Personality Scales

Scale	Items	Cronbach's Alpha
Optimism	6	0.813
Impulsivity	8	0.749
Self-Efficacy	10	0.854

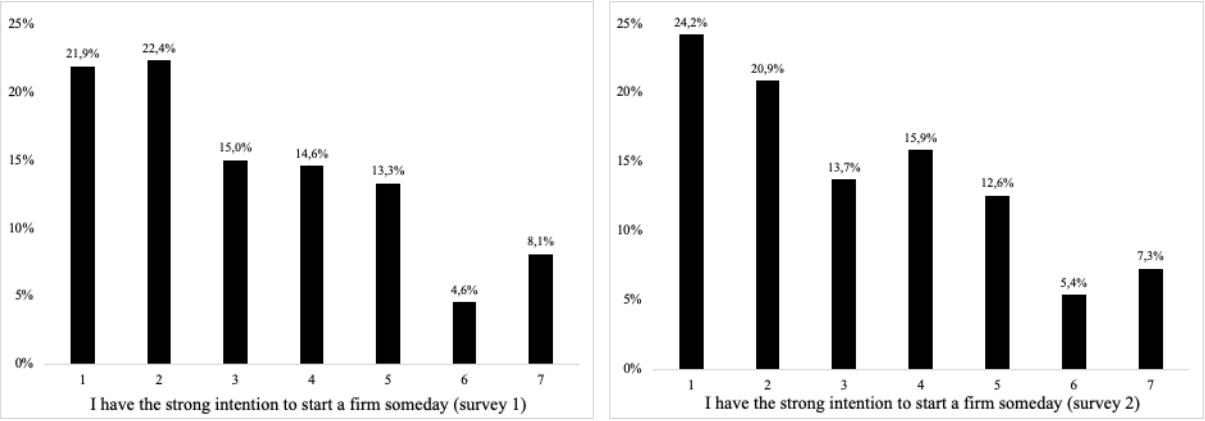
Descriptive Statistics

In this section, the sample's descriptive statistics will be presented and discussed. In Figure 1, the distribution of responses to the statement "I *have the strong intention to start a firm someday*" for both surveys is illustrated. Figure 1 shows that most of the individuals in both surveys chose either option 1 or 2, corresponding to strongly disagree and disagree. In addition,

option 6 and 7 are least common, so it seems that relatively fewer people agree or strongly agree to have a strong intention to start a firm someday, namely less than 15% of people in both surveys. However, it is important to note that, from this figure it is not clear how an individual's response changed from survey 1 to survey 2.

Figure 1

Distribution of Responses to Statement "I have the strong intention to start a firm someday" for Survey 1 and Survey 2

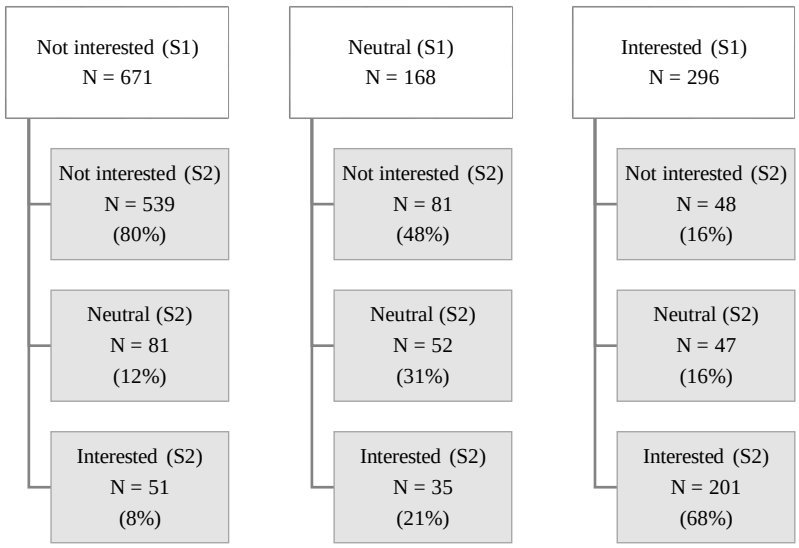


Note. The scale of the variable is a Likert-scale ranging from option strongly disagree (1) to option strongly agree (7).

Figure 2 shows the change in responses to the statement *"I have the strong intention to start a firm someday"* from survey 1 to survey 2. For this figure and the change in entrepreneurial intention options 1, 2 and 3 are marked *Not interested*, option 4 is marked *Neutral* and option 5, 6 and 7 are marked *Interested*. From this figure it becomes clear that among those assigned to the groups *Not interested* or *Interested* in survey 1, a large proportion chose the same option in survey 2 (80% and 68%, respectively). For the individuals who were not interested in the first period, this was followed by the switch to the *Neutral* group. In contrast, for the individuals who were first *Interested*, the same percentage of people decided to become either *Not Interested* or *Neutral* in the following period. Of the respondents who chose *Neutral* in the first survey, most of them became *Not interested* during the second survey, followed by those who stayed *Neutral*.

Figure 2

Change in Distribution of Responses to Statement "I have the strong intention to start a firm someday" from Survey 1 to Survey 2



Furthermore, Table 2 shows the descriptive statistics of the continuous variables. It is interesting to note that for optimism, the total score could range from 0 to 24. However, no participant in this sample scored either the minimum or maximum score. For impulsivity, the total score could range between 8 and 32. In the case of this survey, the individuals' scores range from 11 to 26. Lastly, there is the general self-efficacy scale. Surprisingly, this is the only survey where some individuals obtained the lowest as well as the highest possible scores of 10 and 40, respectively. The participants were not put into categories based on their scores, as the developers of the surveys mentioned that there are no cut-offs and that the scales should be used as a continuous dimension.

Table 2

Descriptive Statistics Continuous Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Optimism	1,124	12.06	2.23	5	20
Impulsivity	1,124	19.50	2.22	11	26
General Self-Efficacy	1,124	30.82	4.54	10	40
Age	1,124	22.87	5.79	17	74

In Table 3, the descriptive statistics for the categorical variables of the sample can be found. In the sample, 667 respondents (59.34%) were female, and 457 participants (40.66%) were male. Regarding the country the students are enrolled in university, most of the students, 652 (58.01%) are enrolled in Belgium, 292 responses (25.80%) are from individuals studying in Portugal, and 182 individuals (16.19%) are enrolled to a university in the Netherlands. As for the field of study, 226 respondents (20.11%) are studying economics or business, and 898 individuals (79.89%) are enrolled in different studies.

Table 3

Descriptive Statistics Categorical Variables

Variable	N	%
Gender		
Female	667	59.34
Male	457	40.66
Country		
Belgium	652	58.01
Portugal	290	25.80
The Netherlands	182	16.19
Subject of study		
Economics/Business	226	20.11
Other	898	79.89

Methodology

In this part of the study, the methods used for the hypothesis testing will be outlined, and the reasoning behind them will be presented.

In the case of entrepreneurial intention, the variable is constructed on a Likert scale. This means that the respondents can choose from different options, ordered in their values. This means that on a scale from 1 to 7, choosing 1 is the lowest option and 7 is the highest; in this case, 1 is selected by individuals who show the lowest interest in starting a new firm someday, and 7 is chosen by individuals who believe that they are most likely to start a new firm. It is important to note that the categories of the variable can be ranked, but the differences between the categories are unknown.

First, a linear regression model was considered, as this model has been used before for variables measured on a 7-point Likert scale. However, in this paper, the entrepreneurial intention is not computed of multiple Likert scale scores, but it is a single item score. This means that the dependent variable cannot be considered an interval measure, leading to the inaccurate use of linear regression (McKelvey & Zavoina, 1975).

Next, because the outcome of the data is ordered, the ordered logistic and ordered probit models were considered. Since, for the probit model, evaluating multiple integrals of the normal distribution was needed, this model was somewhat limited in this research. For this reason, the ordered logistic model was run.

The assumptions of the ordered logistic model are as follows: first, the dependent variable must be measured on an ordinal scale. Second, one or more independent variables need to be either continuous, categorical, or ordinal. The third assumption requires no multicollinearity. All three assumptions hold in the case of the research's sample. The last assumption is the most complex one, the proportional odds assumption. This critical assumption expects that the slopes of the coefficients as identical across each regression. This can be interpreted as follows: each probability curve should differ only in being shifted to the left or the right. A Wald test by Brant (1990) was used to test this assumption, as this test can verify the parallel regression assumption for each variable individually. However, after running these tests, it was shown that the parallel regression assumption has been violated. Since this assumption is violated, an alternative model had to be considered, which does not require this assumption. This led to choosing a model for nominal outcomes.

As mentioned, a different model had to be used in order not to violate critical assumptions. In this research, the multinomial logit for nominal outcomes will be used. In this model, the avoidance of potential assumption violations outweighs the ordinal characteristic of the outcomes.

The multinomial logistic model assumes that the outcome categories are not ordered. The model can be considered as being simultaneous estimations of binary logistic models for all comparisons among the dependent outcomes (Long & Freese, 2006).

These *J* equations can be solved to compute the predicted probabilities for the multinomial logistic model:

$$\Pr(y = m|x) = \frac{\exp(x\beta_{m|b})}{\sum_{j=1}^{J} \exp\,(x\beta_{j|b})}, \qquad (1)$$

where *y* is the observed outcome, *m* is the chosen option, *b* is the base category.

Table 4 presents the correlation matrix for all the variables. Since the variables don't have a high correlation with each other, all the variables can be included in the same regression.

Table 4

Descriptive Statistics and Correlations for the Independent and Control Variables

Variables	N	M	SD	1	2	3	4	5	6	7	8	9
1. Optimism	1,124	12.06	2.23	-								
2. Impulsivity	1,124	19.50	2.22	0.03	-							
3. Self-Efficacy	1,124	30.82	4.54	0.11*	0.27*	-						
4. Age	1,124	22.87	5.79	0.02	-0.03	0.13*	-					
5. Gender[a]	1,124	1.59	0.49	-0.07*	0.05	-0.11*	-0.02	-				
6. The Netherlands[b]	1,124	0.16	0.37	-0.02	-0.02	0.02	0.15*	0.03	-			
7. Belgium[c]	1,124	0.58	0.49	-0.06	0.18*	0.04	0.12*	0.13*	-	-		
8. Portugal[d]	1,124	0.26	0.44	0.09*	-0.18	-0.07*	-0.01	-0.17*	-	-	-	
9. Business Student[e]	1,124	0.20	0.40	0.05	0.02	0.06*	-0.06*	0.02	0.45*	-0.23*	-0.13*	-

Note. * p<0.05. [a] 0 = male and 1 = female, [b] 0 = being enrolled at university in Portugal or Belgium and 1 = being enrolled at a university in the Netherlands, [c] 0 = being enrolled at university in the Netherlands or Portugal and 1 = being enrolled at university in Belgium, [d] 0 = being enrolled at university in the Netherlands or Belgium and 1 = being enrolled at university in Portugal, [e] 0 = being enrolled in a different study than economics or business and 1 = being enrolled in either economics or business.

However, it is essential to mention that after running the multinomial logit model, the coefficients cannot be interpreted, only their sign can be interpreted. By interpreting these coefficients, the results would be incorrect and misleading. New tests need to be run to be able to interpret the size and magnitude of the coefficients. This can be done by running average marginal tests. Nevertheless, since the marginal change depends on the levels of all variables, it can happen that at different levels of the model, the same variables will have a different effect on the categorical variable (Long & Freese, 2006).

Hypothesis Testing of Coefficients

In the tables of the multinomial logistic regression the individual coefficients significance will be shown. However, to reject a hypothesis, it is necessary to test whether as a group the coefficients

are significantly different from zero. This might lead to the situation in which as a group the coefficients are not significantly different from zero, but an individual coefficient is statistically significant, or vice versa. To test the hypothesis, which means testing the significance of the coefficients as a group, a likelihood-ratio test will be run (Long & Freese, 2006).

Robustness Check

To conclude the results part, a robustness check is performed. For the robustness check I will use a different question from the survey that also measures entrepreneurial intention to construct the dependent variables. This will be done to show that the results of thesis' are not dependent on the chosen variables. However, the independent variables and control variables are the same as for the main analysis.

Entrepreneurial intention. In this analysis, the entrepreneurial intention was no longer referring to the intention to start a new firm, but it assessed individuals' desire to be employed or self-employed. Individuals were asked to indicate their future career preferences. The options were self-employed in for-profit and not-for-profit sectors and employed in private, public, and not-for-profit sectors. By looking at the preference of being self-employed or employed, this measure provides a stronger understanding for the desire for entrepreneurship and an alternative way of working, than for entrepreneurial intention. A dummy variable was created based on the answers, which takes the value of 1 if the individual prefers being self-employed, and 0 otherwise.

Change in entrepreneurial intention. The change in entrepreneurial intention was measured by examining the difference in individuals' responses regarding their preference about self-employment during the two surveys. To measure this difference, four categorical variables were created. Two categories are for individuals whose preference did not change during the two surveys (self-employed-self-employed and employed-employed). Two categories are for individuals whose preference did change (self-employed-employed and employed-self-employed).

For entrepreneurial intention, logistic regression was used, a multinomial logistic regression was run for the change in entrepreneurial intention. For both dependent variables the marginal effects were also calculated, like in the main analysis.

Results

In this part the results of the conducted tests will be discussed. Each hypothesis will be looked at and discussed, concluding by either rejecting them or by failing to reject them. Lastly, the robustness checks will be presented and discussed.

Multinomial logistic regression estimates and average marginal effects

Entrepreneurial Intention

In Table 5 and Table 6, the results of the multinomial logistic regression and average marginal effects for the self-reported entrepreneurial intention in survey 1 and survey 2 are presented, respectively. The results of the multinomial logistic regression are based and reported by taking category 4 as the base category. Selecting the base outcome, the category that is the middle and that has symmetric number of categories on both sides, makes the interpretation logical.

First, we start with the interpretation of the results of the multinomial logistic regression with entrepreneurial intention in survey 1 dependent variable (Table 5). As indicated in the fifth column of Table 5, optimism is positively related to choosing option 6 relative to option 4 at 5% significance level (B = .15, p = .038). For the other options relative to base option 4, there is no significant relationship between optimism and entrepreneurial intention.

As shown in the first two columns of Table 5, self-efficacy is negatively related to choosing the two lowest options relative to choosing to be neutral at 1% and 5% significance levels, respectively (B = -.08, p < .001; B = -.06, p = .018). The last column of Table 5 of the first survey's coefficients shows that self-efficacy is positively related to choosing option of strong intention to start a new firm relative to being neutral about it at 1% significance level (B = .12, p < .001). At the same time, self-efficacy is not significantly related to choosing options 3 and 5 relative to option 4.

Finally, impulsivity is not significantly related to choosing any of the options relative to being neutral.

Regarding the results on entrepreneurial intention assessed during the second survey, from the first column, we can conclude that optimism is negatively related to being strongly not interested in starting a new firm relative to being neutral about it at 5% significance level

(B = -.11, p = .013). As shown in the other columns, for the other options relative to the base option 4, there is no significant relationship between optimism and entrepreneurial intention.

From the first two columns of the results regarding the second survey, we can conclude that self-efficacy is negatively associated with choosing the two lowest options relative to being neutral at 5% and 1% significance level, respectively (B = -.05, p = .037; B = -.09, p < .001). The fifth and sixth columns show a positive relation between choosing options 6 and 7 relative to option 4 at 5% and 1% significance levels, respectively (B = .08, p = .042; B = .11, p = .004). For options 3 and 5 relative to base option 4, there is no significant relationship between self-efficacy and entrepreneurial intention.

Finally, impulsivity, just as in the first survey, is not significantly related to choosing either options relative to being neutral.

Table 6 shows the average marginal effects for both surveys. Regarding the average marginal effects assessed during the first survey Table 6 shows that on average, a one point increase in the total score of optimism is associated with an increases the probability of choosing option 6 with 1.1 percentage points at 5% significance level (B = .01, p = .029). Optimism is not significantly related to the probability of choosing any of the other options.

As shown in the first two columns of Table 6, on average, a one point increase in self-efficacy is associated with a 1 percentage point decrease in the probability of choosing the two lowest options regarding being interested in starting a firm someday at 1% and 5% significance levels, respectively (B = -.01, p < .001; B = -.01, p = .022). Moving on to the sixth column in Table 6, it is visible that self-efficacy is related to an increase of 0.4 percentage points in the probability of choosing option 6 at 5% significance level (B = .004, p = .022). In the last column for the first survey, it is shown that on average, a one unit increase in the total score of self-efficacy is associated with an increase in the probability of strong intention to start a new firm by 1 percentage point at 1% significance level (B = .01, p < .001). Self-efficacy is not significantly related to the probabilities of choosing either option 3, 4 or 5.

Regarding the average marginal effects assessed in the first survey, Table 6 shows that there is no significant relationship between impulsivity and the probabilities of choosing any of the options.

Next, in the second part of Table 6 the average marginal effects for the second survey are presented. As shown in the first column of this part, on average, a one unit increase in the score of

optimism is associated with a decrease in the probability of a strong intention not to start a business with 1 percentage point at 5% significance level (B = -.01, p = .045). Next, from the fourth column it is visible that on average a one unit increase in the score of optimism is associated with a 1 percentage point increase in the probability of being neutral about starting a firm at 5% significance level (B = .01, p = .049). Optimism is not significantly related to the probability of choosing any of the other options.

From the first and second columns it is shown that on average, a one-point increase in self-efficacy is associated with a 1 percentage point decrease in the probability of choosing the two lowest options regarding being interested in starting a firm someday at 5% and 1% significance levels, respectively (B = -.01, p = .019; B = -.01, p < .001). Lastly, in the last two columns it is shown that a one unit increase in the total score of self-efficacy is associated with a 1 percentage point increase in the probability of choosing either option 6 or 7 at 1% significance level (B = .01, p = .006; B = .01, p < .001). Self-efficacy is not significantly related to the probability of choosing any of the other options.

Regarding the average marginal effects shown in Table 6, impulsivity is not significantly related to the probability of choosing any of the options.

Table 5

Multinomial Logistic Regression Estimates for Entrepreneurial Intention in Survey 1 (S1) and Survey 2 (S2)

	Base category: 4 (S1)						Base category: 4 (S2)					
Variables	1	2	3	5	6	7	1	2	3	5	6	7
Optimism	-0.01	-0.03	-0.01	0.06	0.15**	0.06	-0.11**	-0.10	-0.06	-0.10	-0.06	-0.03
	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.06)	(0.05)	(0.05)	(0.05)	(0.05)	(0.07)	(0.06)
Impulsivity	0.07	0.05	0.04	0.01	-0.02	0.06	-0.04	0.02	-0.10	-0.08	-0.05	0.02
	(0.05)	(0.05)	(0.05)	(0.06)	(0.08)	(0.07)	(0.05)	(0.05)	(0.05)	(0.06)	(0.07)	(0.07)
General Self-Efficacy	-0.08***	-0.06**	-0.03	-0.03	0.07	0.12***	-0.05**	-0.09***	-0.01	0.01	0.08**	0.11***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
Age	0.04*	0.02	0.02	0.01	0.05	0.06***	0.04*	0.01	-0.05*	0.001	0.02	0.06***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)
Female[a]	0.49**	0.06	0.10	-0.05	0.29	-0.58**	0.42**	-0.09	-0.29	-0.29	-0.33	-0.49*
	(0.22)	(0.21)	(0.23)	(0.23)	(0.34)	(0.28)	(0.21)	(0.21)	(0.23)	(0.23)	(0.31)	(0.28)
Belgium	0.52	0.38	0.21	-0.02	0.75	1.10**	0.31	-0.26	0.12	-0.15	-0.22	0.48
	(0.32)	(0.31)	(0.34)	(0.34)	(0.53)	(0.46)	(0.32)	(0.32)	(0.35)	(0.34)	(0.45)	(0.46)
Portugal	0.01	-0.01	0.09	-0.02	0.85	1.35***	-0.08	-0.11	0.27	0.20	-0.07	0.89*
	(0.36)	(0.35)	(0.38)	(0.37)	(0.57)	(0.49)	(0.36)	(0.35)	(0.39)	(0.38)	(0.51)	(0.50)
Business Student[b]	-0.19	-0.06	-0.20	0.55*	0.84**	1.20***	-0.29	-0.27	0.22	0.53*	0.13	0.79**
	(0.30)	(0.30)	(0.33)	(0.31)	(0.41)	(0.35)	(0.29)	(0.29)	(0.31)	(0.30)	(0.41)	(0.35)
Constant	0.09	0.91	-0.19	-0.20	-6.87***	-8.77***	2.91**	3.30***	3.27**	02.Oct	-1.92	-6.16***
	(1.26)	(1.25)	(1.37)	(1.42)	(2.04)	(1.76)	(1.20)	(1.24)	(1.42)	(1.41)	(1.89)	(1.76)
Observations	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124

Note. Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1. [a] 0 = male and 1 = female, [b] 0 = being enrolled in a different subject than economics or business and 1 = being enrolled in either economics or business. Students studying in the Netherlands are the reference group for the countries. Students studying a subject different from business or economics are reference group for business student.

Table 6

Average Marginal Effects for Entrepreneurial Intention in Survey 1 (S1) and Survey 2 (S2)

	Average Marginal Effects (S1)							Average Marginal Effects (S2)						
Variables	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Optimism	-0.004	-0.01	-0.002	-0.001	0.01	0.01**	0.003	-0.01**	0.002	0.001	0.01**	-0.002	0.001	0.002
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.003)
Impulsivity	0.01	0.003	-0.001	-0.01	-0.004	-0.002	0.002	-0.004	0.01	-0.01	0.01	-0.01	-0.001	0.003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.003)	(0.004)
General Self-Efficacy	-0.01***	-0.01**	-0.001	0.004	-0.001	0.004**	0.01***	-0.01**	-0.01***	0.001	0.003	0.003	0.01***	0.01***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Age	0.004*	-0.001	-0.001	-0.003	-0.002	0.001	0.003***	0.01***	0.001	-0.01***	-0.001	-0.001	0.001	0.004***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.001)
Female[a]	0.08***	-0.01	0.001	-0.01	-0.02	0.01	-0.05***	0.11***	-0.01	-0.03	0.01	-0.03	-0.01	-0.03*
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Belgium	0.04	0.01	-0.02	-0.05	-0.05	0.02	0.04**	0.07*	-0.07	0.01	-0.01	-0.02	-0.02	0.03
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.02)	(0.02)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.02)	(0.02)
Portugal	-0.02	-0.03	-0.01	-0.02	-0.03	0.03	0.08***	-0.03	-0.04	0.03	-0.01	0.02	-0.01	0.05**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.02)	(0.04)	(0.05)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)
Business Student[b]	-0.07**	-0.05	-0.05*	-0.03	0.05*	0.03	0.10***	-0.07**	-0.06*	0.02	-0.01	0.07**	0.001	0.06**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
Observations	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124

Note. Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1. [a] 0 = male and 1 = female, [b] 0 = being enrolled in a different subject than economics or business and 1 = being enrolled in either economics or business. Students studying in the Netherlands are the reference group for the countries. Students studying a subject different from business or economics are reference group for business student.

Hypotheses Testing for Entrepreneurial Intention

Moving on, the likelihood ratio test will be presented to test for the hypotheses regarding the relation between entrepreneurial intention and the personality traits. The results of these tests are presented in Table 7 and Table 8.

From these tables we can conclude that for entrepreneurial intention both assessed in survey 1 and survey 2, we fail to reject the null hypothesis that all of the coefficients associated with optimism are simultaneously equal to 0 at 5% significance level. Also, we fail to reject the null hypothesis that all of the coefficients associated with impulsivity are simultaneously 0 at 5% significance level.

However, the hypothesis that all of the coefficients associated with general self-efficacy are simultaneously 0 can be rejected at 1% significance level. These results are consistent for both surveys. Also, these results are in line with the formulate hypothesis, as they show that a higher self-efficacy is linked to higher probability of entrepreneurial intention.

Table 7

Likelihood-Ratio Test for Independent Variables on Entrepreneurial Intention in Survey 1

Variables	chi2	df	P>chi2
Optimism	9.82	6	0.132
Impulsivity	3.96	6	0.682
General Self-Efficacy	47.79	6	< .001

Table 8

Likelihood-Ratio Test for Independent Variables on Entrepreneurial Intention in Survey 2

Variables	chi2	df	P>chi2
Optimism	6.79	6	0.341
Impulsivity	6.41	6	0.379
General Self-Efficacy	52.42	6	< .001

Change in Entrepreneurial Intentions

In this part, the results for the change in entrepreneurial intentions during the pandemic are presented. In Table 9 the results of the multinomial logistic regression are illustrated, while in Table 10 the average marginal effects are shown.

First, it is essential to mention, that in Table 9, which presents the change in entrepreneurial intention as dependent variable, three different base categories were considered for a more logical interpretation of the results. To interpret the results for individuals who switched from not interested to either neutral or interested the category in which individuals stayed not interested in both periods was taken as the base. For individuals who switched from neutral to either not interested or interested, the group of individuals who stayed neutral was taken as the base. Lastly, for individuals who switched from interested to either not interested or neutral, the group of individuals who stayed interested in both periods was taken as the base outcome.

First, in the third and fourth columns of Table 9, the results relative to staying neutral are presented. These columns show that optimism is negatively related to switching to being interested relative to staying neutral in both periods at 10% significance level (B = -.18, p = .076). Beside this relation, optimism is not significantly related to switching relative to having the same preference in both periods.

As shown in the first two columns of Table 9, self-efficacy is positively related to switching to higher entrepreneurial intentions (neutral and interested), relative to staying not interested in both periods at 10% significance level (B = .05, p = .074; B = .07, p = .051).

As shown in the fifth and sixth columns of Table 9, self-efficacy is negatively related to switching to lower entrepreneurial intentions relative to staying interested in both periods at 5% and 1% significance levels, respectively (B = -.07, p = .088; B = -.10, p = .016). Moreover, self-efficacy is not related to switching to higher or lower intention if in first period the individual was neutral.

Regarding impulsivity, Table 9 shows that impulsivity is not significantly related to switching to any other option in the second period relative to having the same preference in both periods.

Table 9

Multinomial Logistic Regression Estimates for Change in Entrepreneurial Intention

	Base category: NI-NI		Base category: N-N		Base category: I-I	
Variable	NI-N	NI-I	N-NI	N-I	I-NI	I-N
Optimism	0.08	-0.07	-0.08	-0.18*	0.07	0.03
	(0.06)	(0.07)	(0.08)	(0.10)	(0.08)	(0.08)
Impulsivity	0.08	-0.04	-0.03	0.03	0.01	0.01
	(0.06)	(0.07)	(0.09)	(0.11)	(0.08)	(0.08)
General Self-Efficacy	0.05*	0.07*	-0.03	0.01	-0.10**	-0.07*
	(0.03)	(0.04)	(0.04)	(0.06)	(0.04)	(0.04)
Age	-0.01	-0.01	-0.01	0.05	-0.02	-0.02
	(0.02)	(0.03)	(0.05)	(0.04)	(0.03)	(0.03)
Female[a]	0.21	0.08	0.05	-0.45	0.87**	0.11
	(0.26)	(0.31)	(0.37)	(0.45)	(0.36)	(0.34)
Belgium	-0.02	-0.14	-0.06	0.17	0.35	0.21
	(0.41)	(0.47)	(0.53)	(0.71)	(0.58)	(0.50)
Portugal	0.05	0.33	0.09	0.74	0.70	0.10
	(0.46)	(0.51)	(0.59)	(0.76)	(0.60)	(0.54)
Business Student[b]	-0.49	0.10	-0.04	0.03	-0.57	0.16
	(0.41)	(0.43)	(0.51)	(0.64)	(0.45)	(0.40)
Constant	-5.78***	-2.88	3.03	-0.43	0.09	0.49
	-1.49	-1.81	-2.29	-2.75	-2.01	-2.02
Observations	1,124	1,124	1,124	1,124	1,124	1,124

Note. Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1. *NI* = Not Interested, *N* = Neutral, *I* = Interested. [a] 0 = male and 1 = female, [b] 0 = being enrolled in a different subject than economics or business and 1 = being enrolled in either economics or business. Students studying in the Netherlands are the reference group for the countries. Students studying a subject different from business or economics are reference group for business student.

In Table 10 the average marginal effects regarding the change in entrepreneurial intention are shown. From the first column of Table 10 we can conclude that on average, a one point increase in the score of optimism is related to a decrease of 1 percentage point in the probability of being not interested about starting a new business in both periods at 5% significance level (B = -.01, p = .036). As shown in the seventh column of Table 10, on average a one unit increase in optimism is related to an increase of 0.5 percentage points in the probability of being interested in the first period and switching to being not interested in the second period at 10% significance level (B = .01, p = .073). Optimism is not significantly related to the probability of any other scenarios.

In the second column of Table 10 it is shown that on average a one unit increase in the score of impulsivity is associated with an increase of 1 percentage point in the probability of switching from being not interested in the first period to being neutral in the second period at 10% significance level (B = .01, p = .085). Impulsivity is not significantly related to the probability of any other scenarios.

As the first column of Table 10 shows, on average a one unit increase in the score of self-efficacy is associated with a decrease of 2 percentage points in the probability of not being interested in both periods at 1% significance level (B = -.02, p < .001). Lastly, as shown in the last column in Table 10, on average, a one unit increase in self-efficacy is associated with an increase of 1 percentage point in the probability of being interested in starting a new firm in both periods at 1% significance level (B = .01, p < .001). As shown in Table 10, self-efficacy is not significantly related to the probability of any other scenarios.

Table 10

Average Marginal Effects for Change in Entrepreneurial Intention

	Average Marginal Effects								
VARIABLES	NI-NI	NI-N	NI-I	N-NI	N-N	N-I	I-NI	I-N	I-I
Optimism	-0.01**	0.004	-0.01	-0.001	0.003	-0.004	0.01*	0.003	0.01
	(0.01)	(0.004)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.01)
Impulsivity	0.01	0.01*	-0.001	-0.004	-0.001	0.001	-0.001	-0.001	-0.004
	(0.01)	(0.004)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.01)
General Self-Efficacy	-0.02***	0.001	0.001	0.001	0.002	0.001	-0.001	0.001	0.01***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)
Age	0.002	-0.001	-0.001	-0.004*	-0.002	0.001	0.001	-0.001	0.003*
	(0.003)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Female[a]	0.04	0.02	0.01	0.002	-0.001	-0.02	0.02	-0.01	-0.07***
	(0.03)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Belgium	0.04	0.004	-0.003	-0.03	-0.02	-0.004	0.010	0.01	-0.004
	(0.05)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)
Portugal	-0.06	-0.01	0.01	-0.02	-0.02	0.02	0.04*	0.01	0.03
	(0.05)	(0.03)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)
Business Student[b]	-0.11***	-0.04**	-0.01	-0.01	-0.01	-0.004	0.004	0.04*	0.13***
	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)	(0.04)
Observations	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124	1,124

Note. Standard errors are in parentheses, *** p<0.01, ** p<0.05, * p<0.1. *NI* = Not Interested, *N* = Neutral, *I* = Interested. [a] 0 = male and 1 = female, [b] 0 = being enrolled in a different subject than economics or business and 1 = being enrolled in either economics or business. Students studying in the Netherlands are the reference group for the countries. Students studying a subject different from business or economics are reference group for business student.

Hypotheses Testing for Change in Entrepreneurial Intention

In Table 11 the results of the likelihood-ratio tests for the change in entrepreneurial intentions are presented. These results help in deciding whether we reject the hypotheses or if we fail to reject the hypotheses.

From Table 11, for the change in entrepreneurial intention, the hypothesis that all of the coefficients associated with optimism are simultaneously equal to 0 can be rejected at 5% significance level. Likewise, the hypothesis that all of the coefficients associated with general self-efficacy are simultaneously equal to 0 can be rejected at 1% significance level. Since the link between self-efficacy and entrepreneurial intention is positive, it means that a higher level of self-efficacy is associated with a higher probability of entrepreneurial intention. This is in line with our hypothesis.

Lastly, we fail to reject the null hypothesis that all of the coefficients associated with impulsivity are simultaneously 0.

Table 11

Likelihood-Ratio Test for Independent Variables on Change in Entrepreneurial Intention

Variables	chi2	df	P>chi2
Optimism	15.77	8	0.046
Impulsivity	4.97	8	0.761
General Self-Efficacy	39.44	8	< .001

Robustness Check

In this part of the thesis, the results of the robustness check are presented and discussed. In Table 12 the coefficients of the multinomial logistic regression and the average marginal effects are displayed for the preference of being self-employed, while in Table 13 the values obtained after running the multinomial logistic regression and average marginal effects are shown for the change in this preference during the pandemic.

As shown in first and third columns of Table 12, self-efficacy is positively related to choosing to prefer to be self-employed relative to being employed at 1% significance level (B = .05, p = .001; B = .06, p = .001). In neither of the surveys is optimism or impulsivity significantly related to preferring the option of being self-employed relative to being employed.

In the second and forth columns of Table 12 the average marginal effects are shown for both surveys. From these columns we can conclude that on average, an increase of one unit in the score of self-efficacy is associated with an increase of 1 percentage points in the probability of preferring being self-employed at 1% significance level ($B = .01$, $p < .001$; $B = .01$, $p = .001$). This result is consistent throughout the two surveys. As shown in Table 12, optimism and impulsivity are not significantly related to the probability of preferring being self-employed.

Also, regarding the hypothesis, from Table 12 we conclude that the association of general self-efficacy with the probability of being self-employed is significant in both surveys at 1% significance level. Therefore, we reject the null hypothesis that all coefficients associated with general self-efficacy are 0. For the other two independent variables, optimism and impulsivity, we fail to reject the null hypothesis. These findings are in line with the results from the main analysis and underline the robustness of this relationship.

Table 12

Logistic Regression Estimates and Average Marginal Effects for Preference of Being Self-Employed over Being Employed in Survey 1 and Survey 2

	Survey 1		Survey 2	
Variables	Coefficient	Average Marginal Effect	Coefficient	Average Marginal Effect
Optimism	-0.01	-0.001	-0.02	-0.003
	(0.03)	(0.01)	(0.03)	(0.01)
Impulsivity	-0.01	-0.002	-0.03	-0.01
	(0.03)	(0.01)	(0.03)	(0.01)
General Self-Efficacy	0.05***	0.01***	0.06***	0.01***
	(0.02)	(0.003)	(0.02)	(0.003)
Age	-0.01	-0.002	-0.02	-0.003
	(0.01)	(0.003)	(0.01)	(0.002)
Female[a]	-0.27**	-0.06**	-0.18	-0.03
	(0.13)	(0.03)	(0.14)	(0.03)
Belgium	0.59***	0.12***	0.29	0.05
	(0.21)	(0.04)	(0.22)	(0.04)
Portugal	0.33	0.07	-0.08	-0.01
	(0.24)	(0.05)	(0.25)	(0.04)
Business Student[b]	0.15	0.03	-0.09	-0.02
	(0.18)	(0.04)	(0.20)	(0.04)
Constant	-2.14***	-	-1.70**	-
	(0.78)		(0.85)	
Observations	1,124	1,124	1,124	1,124

Note. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. [a] 0 = male and 1 = female, [b] 0 = being enrolled in a different subject than economics or business and 1 = being enrolled in either economics or business. Students studying in the Netherlands are the reference group for the countries. Students studying a subject different from business or economics are reference group for business student.

In the second part of the robustness check, the multinomial logistic regression's coefficients and average marginal effects for the change in the preference of being self-employed and employed are presented.

As shown in the first column of Table 13, impulsivity is negatively related to switching from the preference of employed to preferring being self-employed relative to preferring employment in both periods at 10% significance level (B = -.11, p = .097). Optimism and self-efficacy are not significantly related to switching from preferring employment in both periods. As

shown in the second column, none of optimism, impulsivity or self-efficacy is significantly related to switching from preferring self-employment in both periods.

Moving on to the first column of the second part of Table 13, we can conclude that on average a one unit increase in self-efficacy is associated with a decrease of 1 percentage point in the probability of preferring being employed in both periods at 1% significance level (B = -.01, p < .001).

Finally, in the last column of Table 13 shows that on average a one unit increase in self-efficacy is associated with an increase of 1 percentage point in the probability of preferring self-employment in both periods at 1% significance level (B = .01, p < .001). Self-efficacy is not significantly related to the probability of any other scenarios.

As shown in the last four columns of Table 13, optimism and impulsivity are not significantly related to any of the probabilities.

The last part of the robustness check regards the hypotheses testing for the change in the preference of being either self-employed or employed. These results are illustrated in Table 14.

When testing for the hypotheses, we reject the null hypothesis that all coefficients associated with self-efficacy are 0. The relationship of self-efficacy with intention is significant at 1% significance level. However, we fail to reject the null hypothesis for optimism and impulsivity. These are not significant at 5% significance level.

Table 13

Multinominal Logistic Regression Estimates and Average Marginal Effects for Change in Preference of Being Self-Employed

	Base category: E-E	Base category: SE-SE	Average Marginal Effects			
Variables	E-SE	SE-E	E-E	E-SE	SE-E	SE-SE
Optimism	-0.02	0.02	0.002	-0.001	0.001	-0.003
	(0.07)	(0.05)	(0.01)	(0.003)	(0.01)	(0.01)
Impulsivity	-0.11*	-0.01	0.01	-0.01	-0.001	-0.001
	(0.07)	(0.05)	(0.01)	(0.003)	(0.01)	(0.01)
General Self-Efficacy	0.03	-0.04	-0.01***	0.001	0.001	0.01***
	(0.03)	(0.03)	(0.003)	(0.002)	(0.002)	(0.003)
Age	-0.03	0.01	0.003	-0.001	0.001	-0.002
	(0.03)	(0.02)	(0.003)	(0.001)	(0.002)	(0.002)
Female[a]	0.22	0.14	0.05	0.01	-0.01	-0.05*
	(0.31)	(0.22)	(0.03)	(0.01)	(0.02)	(0.03)
Belgium	-0.31	-0.08	-0.09**	-0.03	0.04	0.08**
	(0.40)	(0.36)	(0.04)	(0.02)	(0.03)	(0.03)
Portugal	-0.66	0.19	-0.03	-0.04	0.04	0.03
	(0.47)	(0.40)	(0.05)	(0.03)	(0.03)	(0.04)
Business Student[b]	-0.22	0.27	-0.02	-0.01	0.04	-0.003
	(0.40)	(0.29)	(0.04)	(0.02)	(0.03)	(0.03)
Constant	-0.12	0.32	-	-	-	-
	(1.72)	(1.29)				
Observations	1,124	1,124	1,124	1,124	1,124	1,124

Note. Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. *E* = Employed, *SE* = Self-employed. [a] 0 = male and 1 = female, [b] 0 = being enrolled in a different subject than economics or business and 1 = being enrolled in either economics or business. Students studying in the Netherlands are the reference group for the countries. Students studying a subject different from business or economics are reference group for business student.

Table 14

Likelihood-Ratio Test for Independent Variables on Change in Preference of Being Self-Employed

Variables	chi2	df	P>chi2
Optimism	0.34	3	0.952
Impulsivity	2.87	3	0.412
General Self-Efficacy	15.66	3	0.001

Conclusion

In December 2019, in China the first cases of COVID patients were reported. Unexpectedly enough, these led to a world-wide pandemic. Previously it was shown that certain personality traits are associated with the way people think of starting new firms. Thus, this paper set out to investigate the relationship between different personality traits, optimism, impulsivity and self-efficacy, and entrepreneurial intention and the change in entrepreneurial intention during the COVID-19 pandemic. Therefore, the following main research question is:

Do different personality traits associate with entrepreneurial intention and change in entrepreneurial intention during the COVID-19 pandemic?

From the results of the analyses, we can conclude that not for all the personality traits there was found a significant link between entrepreneurial intentions and change in entrepreneurial intentions, however, the shown relationships are in the same direction as our expectations.

The first major finding is that there is a positive relationship between self-efficacy and entrepreneurial intention, this relationship being consistent in both surveys. This means that self-efficacy showed a positive relation with the probability of being interested, while it decreases the probability of being not interested. These findings are in line with our expectations based on the literature (Bagheri & Lope Pihie, 2014; Dinther et al., 2011; Walsh & McCollum, 2020). Moreover, there is a positive relation between self-efficacy and the change in entrepreneurial intention during the pandemic. A higher self-efficacy increased the probability of switching to higher entrepreneurial intentions during the pandemic. This relationship means that the higher the individual's level of self-efficacy, the more likely it is that during the pandemic, the individual became interested or at least neutral about entrepreneurial activity. Again, these findings are in line with our expectation based on the literature (De Clercq et al., 2009; Gist, 1992).

Although the majority of the existing studies show a strong link between individuals' optimism on entrepreneurial intention, this relationship was not present in this paper. However, we found positive and significant link between optimism and change in entrepreneurial intention. This positive relation could be explained by the COVID-19 context, as uncertain times might have made entrepreneurs disengage or re-engage from the decision-making process (Rasmussen, 2006). As presented earlier, for optimistic individuals it is easier to re-engage and re-think their strategies.

This was clearly an advantage in the context of the pandemic, as businesses needed adjustments for survival.

The last major finding is that no significant relationship was found for individuals' impulsivity on entrepreneurial intention or on change in entrepreneurial intention. These findings again are not in line with our expectations, as we expected impulsive individuals to engage more in entrepreneurial activity as a consequence of uncertainty (Games et al., 2022; Wiklund et al., 2018). However, this missing relationship might be explained by the fact that in the time of the pandemic, as no one went through something like this before, it was not people's impulsivity which pushed them to follow their intentions, but it was the necessity of the situation, the lack of alternatives.

The main implication of the paper is that, as shown, self-efficacy has the strongest relation with entrepreneurial intention, even in challenging times. For this reason, it might be crucial to help individuals build a strong belief in their own abilities and help them maintain this degree of belief also when facing setbacks, as uncertain times are also great opportunities for new businesses. As all the links between the studies personality traits and entrepreneurial intention depend on the environmental and economic conditions, it would be important to always thrive to support existing businesses, but also new ideas. In times of uncertainty and crises, economies will stagnate, furthermore, without favorable economic conditions, the comeback will be slow and might take a long time.

These results provide new information and insight in the relationship between several personality traits and entrepreneurial intention and change in entrepreneurial intention. Furthermore, these insights add to the existing literature by considering a highly uncertain period, the time of the COVID-19 pandemic.

Limitations and recommendations

There are several limitations to the findings of this research. First, the independent variables, optimism, impulsivity, and self-efficacy, are only measured during the first survey. Previous research showed that individuals' scores for these variables could change over time (Allemand et al., 2008; Roberts & Mroczek, 2008). For example, a more reliable analysis would have been possible if the second survey had also had the same questionnaire for these variables. If

the scores would have been available for both surveys, an aggregate score could have been used as independent variables.

Second, both surveys were conducted already during the pandemic. This means that already during the first survey, the individuals' answers are influenced by the uncertainty cause by the pandemic., the uncertainty is implemented. Hence, the sample does not show individuals' intentions in normal times.

Third, when creating the categories to be able to test the relationships for the change in entrepreneurial change, only individuals who chose option 4 in the surveys were considered neutral. This is in line with the literature, as neutrality lies exactly in the middle. However, by doing this, the category neutral has a smaller sample size, 166 individuals (14.77%) after the first survey and 179 individuals (15.93%) after the second survey. For further research, it might be possible to directly have only three options when measuring individuals' intention to start a new firm: not interested, neutral and interested. This clear division could further help in understanding individuals' preferences, and would avoid the comparison to small categories, as this comparison might have made the results less reliable.

Fourth, as the previous limitations were mainly based on the sample and survey of the research, this last limitation considers the external validity of the findings. This means that the findings are based only on the responses of the students from the following three countries: the Netherlands, Belgium, and Portugal, which means that the results may not be representative for students from other countries.

Lastly, in this research only European students answered the survey. Therefore, the external validity of these results might be limited especially when compared to other demographics, like elderly.

Further research should be conducted to overcome these limitations and to better understand the relationship between personality traits and entrepreneurial intention in uncertain times. First, to overcome the major limitation of this study, a different dataset should be used. A dataset should consist of entrepreneurial intention measured before the pandemic and entrepreneurial intention after the pandemic. By doing this, it would be possible to better account for the effect of the pandemic on the relationship between personality traits and entrepreneurial intention.

Second, further research should be conducted on a different sample than the one used in this study. This could be done by choosing also different demographics, which might change the results of the paper.

Third, further research should include different personality traits than optimism, impulsivity or self-efficacy. In previous studies it was showed that risk-taking (Allah & Nakhaie, 2011; Antoncic et al., 2018), extroversion (Leutner et al., 2014; Zhang et al., 2009) or neuroticism (Kristanto & Pratama, 2020; Zhang et al., 2009) can have been associated with entrepreneurial intentions. Studying these relations under uncertain times might expand the literature.

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Appendix

In this part of the appendix, the survey questions relevant for this study are presented.

Dependent Variables

Please indicate your level of agreement with the following statement:

- *I have the strong intention to start a firm someday.*
- 1. Strongly disagree
- 7. Strongly agree

Think about your future career, what would have your preference?

- Being self-employed/entrepreneur in not-for-profit sector
- Being self-employed/entrepreneur in not-for-profit
- Being employed in the private sector
- Being employed in the public sector (government-related organisations)
- Being employed in the not-for-profit sector

Independent Variables

Optimism

Please answer the following questions about yourself by indicating the extent of your agreement. Be as honest as you can throughout ,and try not to let responses to one question influence your response to other questions. There are no right or wrong answers.

1) In uncertain times, I usually expect the best.
2) It's easy for me to relax.
3) If something can go wrong for me it will.
4) I'm always optimistic about my future.
5) I enjoy my friends a lot.
6) It's important for me to keep busy.
7) I hardly ever expect things to go my way.
8) I don't get upset too easily.
9) I rarely count on good things happening to me.
10) Overall, I expect more good things to happen to me than bad.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Impulsivity

People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and mark your choice. Do not spend too much time on any statement. Answer quickly and honestly.

1. I plan tasks carefully.
2. I do things without thinking.
5. I don't "pay attention."
8. I am self-controlled.
9. I concentrate easily.
12. I am a careful thinker.
14. I say things without thinking.
19. I act on the spur of the moment.

- Rarely/Never
- Occasionally
- Often
- Almost Always/Always

Self-efficacy

Below are 10 statements on how you think and act in general. Please indicate to what extent you disagree or agree with these statements. Please tick the answer for all statements that in general applies to you the most.

1. I can always manage to solve difficult problems if I try hard enough.
2. If someone opposes me, I can find the means and ways to get what I want.
3. It is easy for me to stick to my aims and accomplish my goals.

4. I am confident that I could deal efficiently with unexpected events.
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.
6. I can solve most problems if I invest the necessary effort.
7. I can remain calm when facing difficulties because I can rely on my coping abilities.
8. When I am confronted with a problem, I can usually find several solutions.
9. If I am in trouble, I can usually think of a solution.
10. I can usually handle whatever comes my way.

- Not at all true
- Hardly true
- Moderately true
- Exactly true

Control Variables

Gender

To which gender identity do you most identify?

- Male
- Female
- Other

Age

What is your age?

Subject of Study

What is the subject of your current study?

- Economics/Business
- Psychology
- Law
- Philosophy, arts & letters
- Medicine

- Sciences (biology, chemistry, physics, geography, mathematics)
- Agronomy
- Engineering
- Computer sciences
- Other

Country of Enrolment

In which country are you at the moment?