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Administrative Sciences

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Suggested Citation: Tsaknis, Panagiots A.; Sahinidis, Alexandros G.; Kavoura, Androniki; Kiriakidis, Stavros (2025) : The differential effects of personality traits and risk aversion on entrepreneurial intention following an entrepreneurship course, Administrative Sciences, ISSN 2076-3387, MDPI, Basel, Vol. 15, Iss. 2, pp. 1-15,
<https://doi.org/10.3390/admsci15020053>

This Version is available at:

<https://hdl.handle.net/10419/321197>

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Article

The Differential Effects of Personality Traits and Risk Aversion on Entrepreneurial Intention Following an Entrepreneurship Course

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Abstract: This paper addresses a research gap by examining how two groups of individuals with different personality traits (more entrepreneurial personalities versus less entrepreneurial personalities) react to changes in entrepreneurial intention after attending an entrepreneurship course. A key aspect of this study lies in its application of MEMORE; this tool was crucial in determining whether changes in entrepreneurial intention were driven by changes in the factors of the Theory of Planned Behavior (TPB) in each group of individuals. The survey employed a pre-test–post-test questionnaire design distributed before and after a university-level entrepreneurship course. The results indicated that individuals with more entrepreneurial personalities (characterized by high openness, conscientiousness, and extraversion and low neuroticism and risk aversion) had higher levels of entrepreneurial intention, attitude, subjective norms, and perceived behavioral control compared to less entrepreneurial personalities. After the course, more entrepreneurial personalities reported higher entrepreneurial intentions and perceived behavioral control. MEMORE indicated that changes in perceived behavioral control affected the increase in entrepreneurial intentions. Less entrepreneurial personalities demonstrated a decline in entrepreneurial intention but a positive change in perceived behavioral control; this change did not affect the decline in entrepreneurial intentions. This study provides essential insights into an underexplored area, advancing knowledge in this field.

Keywords: personality; risk aversion; entrepreneurial intention; theory of planned behavior; TPB; entrepreneurship education; entrepreneurship; MEMORE macro



Received: 23 December 2024

Revised: 3 February 2025

Accepted: 7 February 2025

Published: 10 February 2025

Citation: Tsaknis, P. A., Sahinidis, A. G., Kavoura, A., & Kiriakidis, S. (2025). The Differential Effects of Personality Traits and Risk Aversion on Entrepreneurial Intention Following an Entrepreneurship Course. *Administrative Sciences*, 15(2), 53. <https://doi.org/10.3390/admsci15020053>

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1. Introduction

The study of entrepreneurial intention has attracted the interest of researchers and society both locally and globally. The first studies on entrepreneurial intention began more than 40 years ago (Tsaknis & Sahinidis, 2024; Krueger et al., 2000; Fayolle & Liñán, 2014). In an attempt to develop a model that would better explain intention, various theories have been developed, such as Bandura's self-efficacy theory (1997), Ajzen's Theory of Planned Behavior (TPB) (1991), Bird's entrepreneurial intention model (1988), the entrepreneurial intention model (Shapero & Sokol, 1982), and the approach that combines this model with the TPB (Reitan, 1996). In the present study, Ajzen's TPB is used to interpret the factors that influence entrepreneurial intention (Tsaknis & Sahinidis, 2020).

In the mid-20th century, studies were developed that focused on the personality characteristics of entrepreneurs (Kerr et al., 2018). The result of these studies is the development of a common theoretical basis that serves to support further scientific investigation of the subject. In the 1990s, the Big Five personality trait model was developed (Costa & McCrae, 1992). In an attempt to correlate personality traits with entrepreneurial intention, an additional trait, risk aversion, was emphasized (Hossain et al., 2024; Zhao & Seibert, 2006). Several research studies have linked risk taking to entrepreneurial intention, reaching interesting conclusions (Sahinidis et al., 2020; Şahin et al., 2019).

Various personality traits (the five-factor model: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) and risk aversion seem to affect the levels of entrepreneurial intention differently (Hossain et al., 2024; Mohamed et al., 2023; Şahin et al., 2019). For example, individuals with higher levels of openness to experience, extraversion, and conscientiousness have higher levels of entrepreneurial intention (Sahinidis et al., 2020; Toegel & Barsoux, 2012; Zhao & Seibert, 2006; Wang et al., 2016). A significant number of studies argue that the trait of agreeableness shows statistically significant negative effects on entrepreneurial intention (Toegel & Barsoux, 2012; Tsaknis & Sahinidis, 2024). Finally, high levels of neuroticism and risk aversion have a negative impact on entrepreneurial intention (Tsaknis & Sahinidis, 2024; Sahinidis et al., 2020).

Based on these insights, this study further differentiates between individuals with a more entrepreneurial personality and those with a less entrepreneurial personality. A more entrepreneurial personality is characterized by traits such as high openness to experience, extraversion, and conscientiousness and low neuroticism, agreeableness, and risk aversion. Conversely, individuals with a less entrepreneurial personality tend to exhibit lower levels of openness to experience, extraversion, and conscientiousness while demonstrating higher levels of neuroticism, agreeableness, and risk aversion (Kang et al., 2023; Ahmed et al., 2022). This distinction allows for a deeper exploration of how different personality profiles influence entrepreneurial intention, particularly in the context of entrepreneurship education.

Personality plays a crucial role in shaping entrepreneurial intention, especially in combination with the influence of entrepreneurship education. Exploring the relationship between different personality profiles and the influence of entrepreneurship education is crucial, as it can lead to educational strategies that take into account the personality of each individual, maximizing entrepreneurial intention and promoting a more personalized and effective approach (Fayolle & Liñán, 2014; Krueger et al., 2000). University programs that aim to foster entrepreneurial knowledge, skills, and attitudes have gained significant attention in recent years (Tsaknis et al., 2024b). It has been shown that entrepreneurship education can enhance the factors of Ajzen's TPB (attitude, subjective norms, and perceived behavioral control), which are crucial in influencing entrepreneurial intentions (Fayolle & Liñán, 2014; Krueger et al., 2000). According to Maresch et al. (2016), entrepreneurship education improves students' attitudes toward entrepreneurship and strengthens their self-efficacy and confidence in their ability to pursue entrepreneurial activities. By creating a supportive environment and fostering connections with entrepreneurial peers, entrepreneurship education can also influence subjective norms. Despite the growing body of literature on the topic, limited research has examined how personality traits and factors of TPB interact with entrepreneurship education to influence entrepreneurial intention, particularly by considering the distinction between individuals with more and less entrepreneurial personalities (Tsaknis & Sahinidis, 2024).

In this paper, the variable of "entrepreneurship education" was used in combination with Ajzen's TPB elements, together with personality (the big five), to identify the factors that influence entrepreneurial intention. The international literature has highlighted the

lack of research examining how two different groups of individuals with different personality traits react to changes in entrepreneurial intention following the attendance of an entrepreneurship course, taking into account the factors of TPB (Tsaknis & Sahinidis, 2024; Tsaknis et al., 2024b). It is important to further explore how entrepreneurship education affects different groups of students depending on their personalities, making this study an important contribution to the field.

2. Theoretical Framework

Costa and McCrae (1992) developed the Five-Factor Model (FFM) as a framework for analyzing many confounding personality variables. In order to explain the multifaceted nature of the human personality, this conceptual model was developed to explain the characteristics of the personality (neuroticism, extraversion, conscientiousness, agreeableness, and openness to experience) in five broad categories. The five-factor model was used by researchers to analyze the personality of entrepreneurs (Zhao & Seibert, 2006). As determined by their study, entrepreneurs are highly conscientious, emotionally stable (the opposite of neuroticism), agreeable, extroverted, and open-minded. An important characteristic of entrepreneurial research has been risk taking (Rauch & Frese, 2007; Tsaknis et al., 2022b). Risk aversion is a complex personality trait that reflects a combination of low extraversion, openness, and non-emotional stability (high neuroticism), along with high levels of agreeableness and conscientiousness (Nicholson et al., 2005). Risk aversion has been argued by some researchers to be a separate sixth dimension of personality, and some others have argued it should be an additional personality construct outside the FFM due to its theoretical importance and difficulty in classification (Paunonen & Jackson, 1996; Sahinidis & Tsaknis, 2021).

Entrepreneurs are characterized by specific traits that are aligned with entrepreneurial behavior. An entrepreneurial personality is characterized by individuals with high levels of openness, conscientiousness, and extraversion, combined with low levels of neuroticism and risk aversion (Kang et al., 2023; Ahmed et al., 2022). High levels of openness reflect creativity, adaptability, and a strong desire to explore new opportunities. Individuals who are conscientious are organized, reliable, and persistent, all of which are critical characteristics for navigating the complexities of entrepreneurship. Entrepreneurship requires extraversion, which involves socialization, assertiveness, and energy. Low neuroticism, a sign of emotional stability, ensures resilience to stress and uncertainty, while low risk aversion indicates a willingness to embrace challenges and uncertainties. When these traits are combined, they form a personality profile suitable for identifying and pursuing entrepreneurial opportunities. In entrepreneurial environments, agreeableness plays a complex role. Lower levels can enhance assertiveness, negotiation, and resilience, whereas excessive levels may prevent collaboration and trust-building, both of which are crucial to success. For an entrepreneurial outcome, a balanced level of agreeableness combining cooperation and assertiveness is likely most effective (Kang et al., 2023; Sahinidis et al., 2020).

Conversely, a less entrepreneurial personality may exhibit traits that may impede entrepreneurial intentions and behaviors. Individuals with low levels of openness, conscientiousness, and extraversion, combined with high neuroticism and risk aversion, are less likely to pursue entrepreneurial paths (Kang et al., 2023; Ahmed et al., 2022). The absence of openness inhibits creativity and the ability to adapt to changing environments, whereas low conscientiousness hinders the discipline and persistence necessary to succeed in business. Additionally, low extraversion can inhibit networking and leadership skills, which are crucial to building and maintaining a business. Risk taking and innovation are discouraged in people with high neuroticism, which is characterized by anxiety and emotional instability. The prioritization of security and stability over entrepreneurship

further reduces entrepreneurship's likelihood because of high risk aversion. A combination of these traits creates a personality profile that is less compatible with the demands of entrepreneurship (Sahinidis et al., 2020).

Entrepreneurship education is associated with society's needs to provide tendencies among students to follow entrepreneurial activities. The strategic importance of the educational framework is beneficial in fostering entrepreneurial activity (Kavoura & Andersson, 2016; Makarona & Kavoura, 2019; Xanthopoulou et al., 2024). With an increasing number of universities around the world offering entrepreneurship programs, entrepreneurship has seen rapid growth in academic and teaching fields (Tsaknis et al., 2024a). One of the main objectives of entrepreneurship education is to develop entrepreneurial knowledge, skills, and attitudes that enable students to think and act entrepreneurially in order to identify and make the best use of entrepreneurial opportunities. Cotrugli (1990) raised the question of whether and how entrepreneurial skills and competencies can be promoted through education. Educating aspiring entrepreneurs increases their familiarity with entrepreneurship and their intention to become entrepreneurs (Fayolle & Gailly, 2015; Martin et al., 2013; Autio et al., 2001). As part of education, knowledge is transferred; challenges and processes of entrepreneurship are communicated; and competencies, goals, skills, career choices, behaviors, performance, and ways of action are developed (Nabi et al., 2017; Vodă & Florea, 2019). Based on the above, entrepreneurship education appears to enhance students' entrepreneurial intentions (Maresch et al., 2016).

TPB is a psychological theory that explains human behavior and decision-making processes, including entrepreneurial intentions. According to TPB, individual intentions are the most accurate predictors of behavior, influenced by three factors: attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). Entrepreneurship education significantly impacts attitudes, subjective norms, and perceived behavioral control, leading to increased entrepreneurial intention. This suggests that entrepreneurship education enhances students' attitudes toward entrepreneurship, strengthens their belief in their ability to succeed, fosters stronger social support and encouragement from their social networks (by creating a new circle of students who have the same interests in entrepreneurship), and increases their perceived control over the entrepreneurial process, thereby promoting stronger entrepreneurial intentions (Maresch et al., 2016; Souitaris et al., 2007; Mustofa et al., 2018; Kautonen et al., 2015; Tsaknis et al., 2022a).

Robinson et al. (1991) suggest that educators and practitioners can influence entrepreneurial attitudes. Entrepreneurship courses can help individuals feel confident about their ability to control their behavior when starting their own business (Dyer, 1995). Educating students about entrepreneurship increases their knowledge, enhances their self-confidence, and strengthens their self-efficacy, in turn increasing the perception that entrepreneurship is a feasible option. In entrepreneurship education, students learn the rewards that can be obtained by starting a business, increasing their perception that entrepreneurship is desirable. Several studies have shown a positive correlation between entrepreneurship education and entrepreneurial intention (Maresch et al., 2016; Souitaris et al., 2007). Professors' efforts, knowledge, passion to sharpen students' critical thinking, and encouragement are generally associated with the shaping of positive attitudes toward entrepreneurship (Hong, 1996). As a result of entrepreneurship education, students evaluate the consequences of entrepreneurship differently. Entrepreneurship education tends to emphasize profits over other career options, thereby strengthening students' positive attitude toward entrepreneurship. Developing positive attitudes leads to the strengthening of entrepreneurial intentions. Based on the above, it can be assumed that entrepreneurship education strengthens positive attitudes and, subsequently, entrepreneurial intentions (Kautonen et al., 2015; Tsaknis et al., 2022a).

Subjective norms describe how friends, family, and significant others view the decision to start a new business and whether they support or reject it. Entrepreneurship education fosters teamwork (through the formation of a new circle of entrepreneurial friends). During the educational process, subjective norms affect participants' social environments and may even encourage and support their entrepreneurial intentions (Souitaris et al., 2007; Mustofa et al., 2018; Entrialgo & Iglesias, 2016; Nabi et al., 2017). Several methods are used to teach entrepreneurship, such as group work and teamwork (created by forming a new circle of entrepreneurs), leading to an increase in students' entrepreneurial intentions influenced by friends' opinions (Souitaris et al., 2007; Mustofa et al., 2018; Entrialgo & Iglesias, 2016; Nabi et al., 2017). Entrepreneurship education affects subjective norms and entrepreneurial intentions. Entrepreneurship education indirectly affects entrepreneurial intention through changes in subjective norms (before and after education). When students gain more knowledge of entrepreneurship, they are likely to be more confident and capable of evaluating business opportunities, as well as securing the necessary resources to start a business (Maresch et al., 2016). Entrepreneurship education indirectly affects entrepreneurial intention through changes in perceived control (before and after education).

Several studies have examined the effect of entrepreneurship courses on entrepreneurial intention, but few have examined the role of personality traits—specifically, the distinction between more and less entrepreneurial personalities (Tsaknis et al., 2022a; Fairlie & Holleran, 2012). Using personality factors in conjunction with the TPB framework, this study offers a deeper understanding of how individual differences affect the effectiveness of entrepreneurship education. Moreover, the analysis of changes in entrepreneurial intention before and after the course using the MEMORE macro (a statistical tool for analyzing within-subject mediation in repeated measures) is a significant contribution to the field, allowing for an assessment of how changes in mediators (attitude, subjective norms, and perceived behavioral control) influence entrepreneurial intention. This combination of personality, TPB, and advanced statistical analysis presents a unique and valuable perspective on how entrepreneurship education can be tailored to foster higher entrepreneurial intention based on individual traits.

In order to improve the effectiveness of entrepreneurship education, it is necessary to gain a deeper understanding of personality, which enables more targeted and tailored interventions to be offered. It appears that not all participants benefit equally from such education. If it is proven that specific aspects of personality interact positively with education; then, it is possible to design programs that enhance these characteristics or create tools that adapt the learning experience to the needs of each participant. Consequently, this study can contribute to the strengthening of entrepreneurial culture and the effectiveness of related programs. Research on the impact of personality on entrepreneurial intention has raised intense concerns. Entrepreneurial intentions are often correlated with personality traits, drawing interesting conclusions that require further investigation. Their main question is whether specific personality traits are associated with entrepreneurial intentions. Following these questions, the present study investigates whether individuals with more entrepreneurial personalities (those with high openness, conscientiousness, and extraversion and low neuroticism and risk aversion) show higher levels of entrepreneurial intention after taking an entrepreneurship course compared to those with a less entrepreneurial personality. According to this study, certain personality traits benefit more from entrepreneurship education, resulting in significant improvements in an individual's intention to engage in entrepreneurial activity. This study, with the use of the MEMORE macro, investigates whether changes in entrepreneurial intention are influenced by changes in the key factors of the TPB (attitudes, subjective norms, and perceived behavioral control).

3. Materials and Methods

Considering the complexity of the study and the research orientation, it is considered more appropriate to use the questionnaire method. In order to determine which characteristics influence an individual's intention, the research is based on both the personality (Big Five personality traits and risk aversion), as well as the TPB. Therefore, the proposed methodological approach is a combination of positivist and interpretive paradigms. To achieve the purpose of the research, it was deemed necessary for a group of students to complete two pre-experimental/post-experimental questionnaires (pre-test/post-test group design). The first questionnaire was completed by 430 students at the beginning of the entrepreneurship course, and the second was completed 13 weeks later, at the end of the semester, by 315 students (189 women and 126 men) who had completed the initial questionnaire. The two main causes of this attrition were students either failing to complete both questionnaires or discontinuing the study program. The survey participants were divided into four age groups (18–24, 25–34, 35–44, and 45–54). The first age group (18–24) included 291 students, the second (25–34) included 14 students, the third (35–44) included 4, and the fourth (45–54) included 6 students. The data were collected using Google Forms, and the student responses were collected by sending them a link to each questionnaire. In order to perform this analysis, questions that measure the examined components inversely were reversed. In accordance with international literature methods, reverse questions were only used for personality assessment (Costa & McCrae, 1992). According to established best practices in personality research, reverse-scored items were included to control for acquiescence bias and improve response validity.

Statistical analysis of the responses was performed using SPSS version 24. This study used Principal Component Analysis (PCA) to determine the linear components existing in the data and the variables influencing them. Cluster analysis grouped our sample into two groups with different personalities and different entrepreneurial intention levels before and after education. One-way ANOVA was conducted to determine if there were statistically significant differences between the groups with respect to the examined variables. The test compares the entrepreneurial intention levels of the two groups to determine if they differ significantly. *t*-test analysis in each group indicated the differences in the examined factors before and after education (attitude, subjective norms, perceived behavioral control, and entrepreneurial intention). Finally, the MEMORE macro (a statistical tool that enables the analysis of within-subject mediation in repeated measures) evaluated whether, in each group, differences in entrepreneurial intention levels before and after education were due to attitude, subjective norms, or perceived behavioral control differences.

According to Judd et al. (2001), the procedures for investigating mediation and moderation in the case of repeated measures (within-subject designs) are limited, and researchers suggest methods based on the use of differences in regression models (Judd et al., 2001). By adding the central value of the predictors, the effect coefficients can be calculated based on their actual size. According to Montoya and Hayes (2017), researchers who estimate both direct and indirect effects of mediation in studies using dependent samples (measurement in the same group of respondents in two different time periods/conditions) use the method of Judd et al. (2001). While Judd et al. (2001) only considered one mediating variable, Montoya and Hayes (2017) extended this methodology to multiple mediating variables by developing the MEMORE SPSS add-in. Based on the PROCESS add-in, the MEMORE add-in integrates all the necessary procedures and adjustments related to dependent samples (Montoya & Hayes, 2017; Montoya, 2019). Unlike mediation in independent samples (between subjects), where the independent variable is observable, in the dependent sample design (within subjects) the independent variable is related to the two different moments or conditions and is not observable. Education is the independent variable for the factors

examined in this section. The mediating factors and the dependent variable are measured in two conditions before and after entrepreneurship education for each cluster.

4. Results

PCA indicated that the variables with the highest loadings were assigned to each component (Field, 2024). The sample adequacy indicators, the KMO (Kaiser–Meyer–Olkin Measure of Sampling Adequacy), and Bartlett’s Test of Sphericity indicated that the sample data met the criteria for PCA and that the application of this analysis was valid. The questions loaded onto the components corresponding to the relevant subscales according to theory. The components corresponding to personality factors (openness, conscientiousness, extraversion, agreeableness, and neuroticism), risk aversion, the factors of the TPB, and entrepreneurial intention (before and after education) had loadings above 0.5. Cronbach’s Alpha reliability coefficient for the components was above 0.7. Cronbach’s Alpha of agreeableness was 0.446. It was observed that the component corresponding to agreeableness showed a low reliability coefficient, indicating a low level of internal consistency among the specific questions forming this component. In many empirical studies, the agreeableness factor has shown low Cronbach’s Alpha reliability coefficient (Brito-Costa et al., 2015).

Individuals whose entrepreneurial intention underwent a statistically significant change were investigated based on their personalities. Cluster analysis was used to determine whether numerous groups of students were present in the sample with similar personality characteristics and changes in entrepreneurial intention (entrepreneurial intention (after–before)). Based on Schwartz’s Bayesian criterion and log-likelihood calculation, the two-step method was applied. Two clusters were identified (Table 1) with $N = 113$ and $N = 202$ students, respectively. In the first cluster ($N = 113$), there were 37 men and 76 women. The majority of students (105) were aged 18–24, while 5 were in the 25–34 age group, 2 in the 35–44 group, and 1 in the 45–54 group. In the second cluster ($N = 202$), there were 89 men and 113 women. Most students (186) were aged 18–24, while 9 belonged to the 25–34 age group, 2 to the 35–44 group, and 5 to the 45–54 group.

Table 1. Cluster analysis.

	Cluster 1	Cluster 2	ANOVA
Component	N = 113 (36%)	N = 202 (64%)	p-Value
Openness	4.521	5.075	<0.01
Conscientiousness	5.527	5.863	<0.01
Extraversion	4.534	5.201	<0.01
Agreeableness	5.133	5.045	0.398
Neuroticism	3.746	3.081	<0.01
Risk Aversion	3.677	2.420	<0.01
Attitude (Before)	4.678	5.483	<0.01
Subjective Norms (Before)	5.050	5.493	<0.01
Perceived Behavioral Control (Before)	3.674	4.221	<0.01
Entrepreneurial Intention (Before)	3.854	5.104	<0.01
Attitude (After)	4.631	5.541	<0.01
Subjective Norms (After)	4.802	5.503	<0.01
Perceived Behavioral Control (After)	3.926	4.533	<0.01
Entrepreneurial Intention (After)	3.520	5.459	<0.01
Entrepreneurial Intention (After-Before)	−0.334	0.355	<0.01

Cluster analysis of the group based on their personality traits.

It was found that the silhouette score was 0.31 (Crum et al., 2022). According to one-way ANOVA, statistically significant differences were found between clusters for the following variables: openness to experience, conscientiousness, extraversion, neuroticism,

risk aversion, attitude, subjective norms, perceived behavioral control, and entrepreneurial intention before and after entrepreneurship education. However, agreeableness did not indicate any statistically significant difference between clusters, so we cannot draw conclusions regarding this trait.

In the first cluster, participants indicated statistically significant decreases in entrepreneurial intentions after the entrepreneurship course. In comparison with the second cluster, these individuals (cluster 1) were less open to experience, less extroverted, and less conscientious and indicated higher levels of neuroticism and risk aversion. A one-way ANOVA revealed no statistically significant difference between the two clusters in the agreeableness variable. There was a statistically significant positive change in entrepreneurial intention for participants in the second cluster after the entrepreneurship course. Compared to the first cluster, individuals in the second cluster are more open to experience, more conscientious, and more extroverted, while they are less neurotic and risk-averse.

The following two graphs illustrate the means of the components of personality traits, entrepreneurial intentions, and TPB for each cluster. Chart 1 shows the mean scores of the components of personality. Chart 2 illustrates the mean scores of the components of the Theory of Planned Behavior (TPB) before and after education.

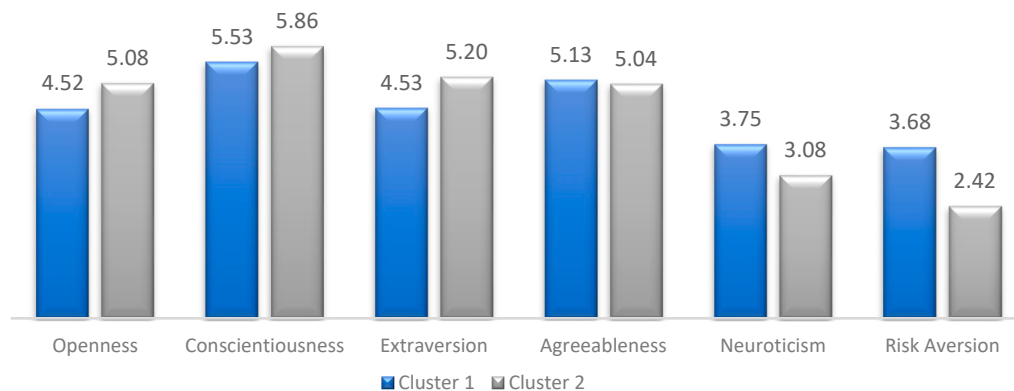


Chart 1. Mean of the components of personality for each cluster.

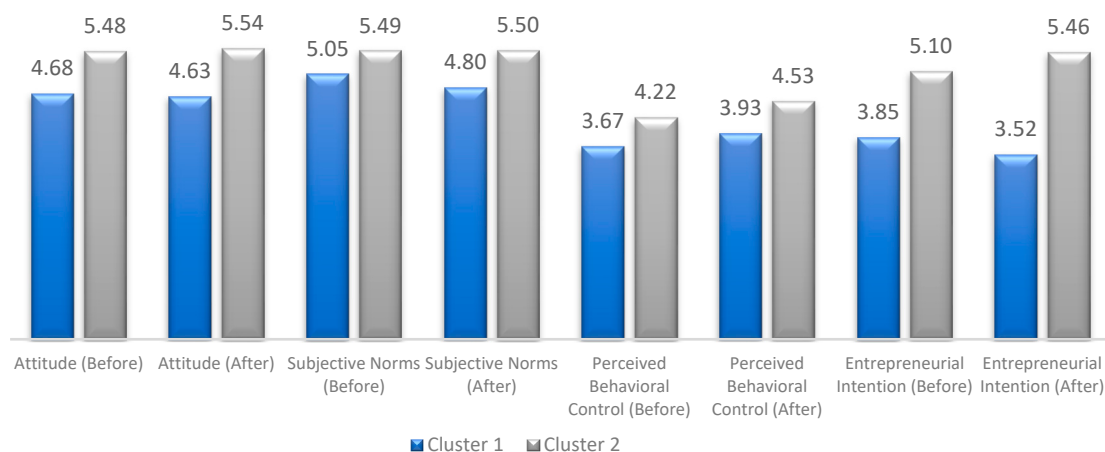


Chart 2. Mean of the components of the TPB (before and after education) for each cluster.

In the following tables, the *t*-test results are presented for the examined pairs of samples within each cluster. Table 2 summarizes the statistics for each of the experimental conditions (the mean, the standard deviation, and the standard error) for the first cluster, and Table 3 corresponds to the second cluster. In the first cluster, there was no statistically significant difference between attitudes and subjective norms. There was a

positive difference in the means of perceived behavioral control and a negative difference in entrepreneurial intention after the entrepreneurship course. On the other hand, in the second cluster (Table 3), perceived behavioral control and entrepreneurial intention were positively affected.

Table 2. Paired-sample *t*-test in the first cluster.

	Mean	Std. Deviation	Std. Error Mean	<i>t</i>	Sig. (2-Tailed)
Entrepreneurial Intention (After–Before)	−0.334	1.016	0.096	−3.494	0.001
Perceived Behavioral Control (After–Before)	0.251	0.902	0.085	2.961	0.004
Subjective Norms (After–Before)	−0.248	1.349	0.127	−1.953	0.053
Attitude (After–Before)	−0.047	0.909	0.086	−0.552	0.582

Paired-sample *t*-test in the first cluster (less entrepreneurial personality).

Table 3. Paired-sample *t*-test in the second cluster.

	Mean	Std. Deviation	Std. Error Mean	<i>t</i>	Sig. (2-Tailed)
Entrepreneurial Intention (After–Before)	0.355	1.085	0.076	4.653	0.000
Perceived Behavioral Control (After–Before)	0.312	0.979	0.069	4.526	0.000
Subjective Norms (After–Before)	0.010	1.588	0.112	0.089	0.929
Attitude (After–Before)	0.058	0.899	0.063	0.913	0.362

Paired-sample *t*-test in the second cluster (more entrepreneurial personality).

According to the model presented below (Figure 1), entrepreneurship education causes a statically significant and negative total effect ($c = -0.334$, $p < 0.01$) and direct effect ($c' = -0.313$, $p < 0.01$) in entrepreneurial intention. It did not cause a direct statically significant change in attitude ($a1 = -0.047$, $p = 0.582$) or subjective norms ($a2 = -0.248$, $p = 0.053$) but changed positively perceived behavioral control ($a3 = 0.251$, $p < 0.01$). The positive change in perceived behavioral control did not cause changes in entrepreneurial intention ($b3 = 0.129$, $p = 0.211$).

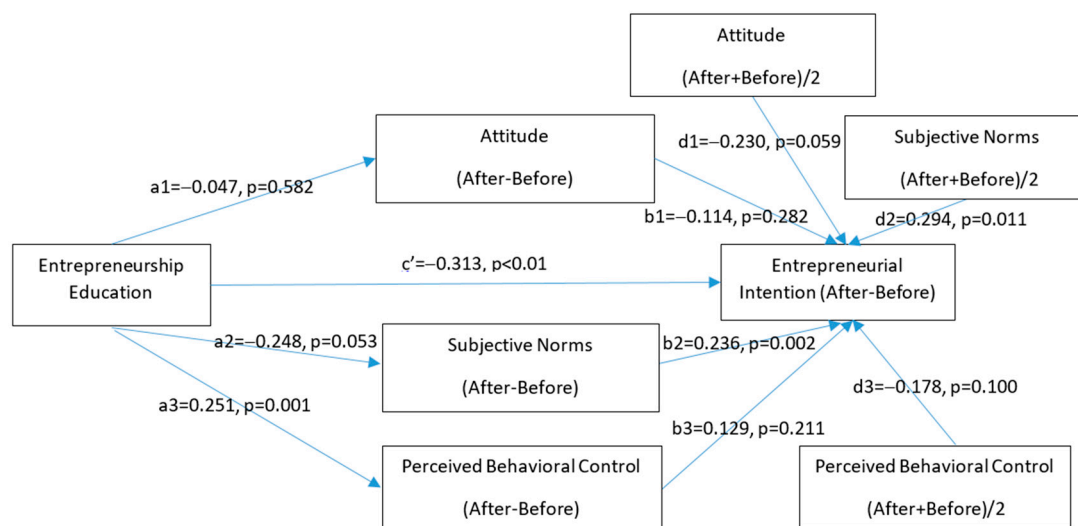


Figure 1. MEMORE macro for cluster 1.

According to the model presented below (Figure 2), entrepreneurship education causes a statically significant and positive total effect ($c = 0.355$, $p < 0.01$) and a direct effect change in entrepreneurial intention ($c' = 0.266$, $p < 0.01$). It did not cause a direct statistically significant change in attitude ($a1 = 0.058$, $p = 0.362$) or subjective norms ($a2 = 0.01$, $p = 0.929$) but changed positively perceived behavioral control ($a3 = 0.312$, $p < 0.01$). The positive

change in perceived behavioral control caused positive changes in entrepreneurial intention ($b_3 = 0.242, p < 0.01$).

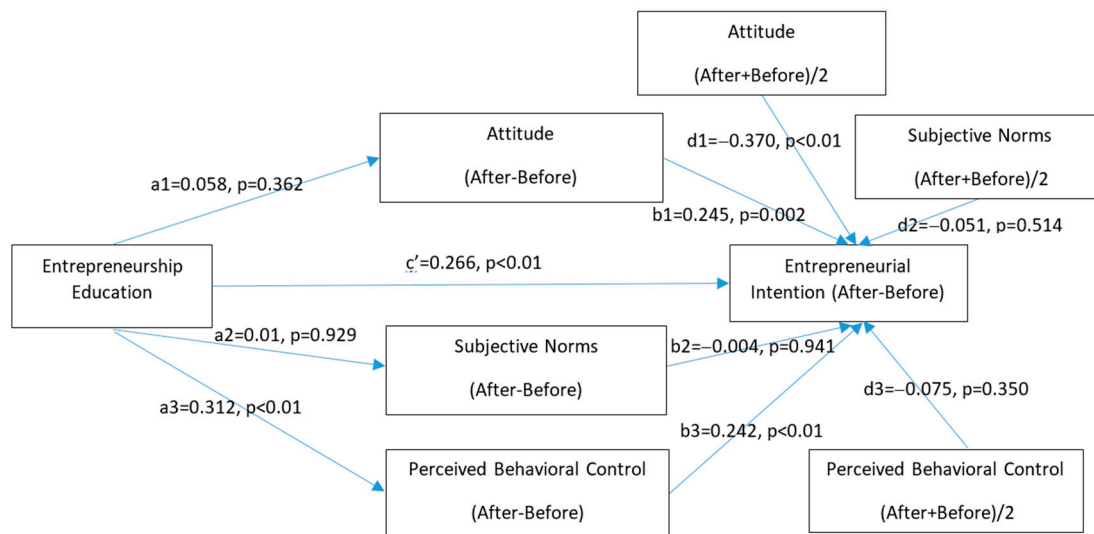


Figure 2. MEMORE macro for cluster 2.

5. Discussion

This paper attempts to fill a research gap by examining the effectiveness of entrepreneurship education according to distinct personality profiles. Individuals with more entrepreneurial personalities (characterized by high openness, conscientiousness, and extraversion and low neuroticism and aversion) were compared with individuals with less entrepreneurial personalities. Using a pre-test-post-test design, data were collected before and after taking a university-level entrepreneurship course. Between-group comparisons conducted via one-way ANOVA revealed that individuals with a more entrepreneurial personality indicated higher levels of attitude, subjective norms, perceived behavioral control, and entrepreneurial intention. Furthermore, after the course, they experienced a significant increase in entrepreneurial intention and perceived behavioral control. On the contrary, individuals with a less entrepreneurial personality, starting with lower levels of entrepreneurial intention, exhibited a further decline after the course and indicated an increase in perceived behavioral control.

A key aspect of this study lies in its application of the MEMORE macro, a statistical tool that enables the analysis of within-subject mediation in repeated measures. This tool was crucial in determining whether changes in entrepreneurial intention were driven by changes in TPB factors in each group of individuals, offering a novel methodological approach for studying these relationships. Results indicated that in the more entrepreneurial personality group, the positive change in perceived behavioral control significantly contributed to the positive change in entrepreneurial intention. It is likely that entrepreneurship education strengthens and reinforces the entrepreneurial tendencies of such individuals, enabling them to be more confident about pursuing an entrepreneurial career. In the less entrepreneurial personality group, the positive change in perceived behavioral control did not affect the decline in entrepreneurial intention. Although students may develop greater confidence in their entrepreneurial skills, this does not necessarily translate into a stronger desire to pursue entrepreneurship.

According to the findings, entrepreneurship education may not benefit all students equally. It is evident that entrepreneurship education should be tailored to meet the needs of different personality types. While previous studies have shown that entrepreneurial education fosters skills and intentions (Rauch & Hulsink, 2015; Tsaknis et al., 2024a; Entrialgo

& Iglesias, 2016), this study provides empirical evidence that its impact varies based on individual personality profiles. Organizations and institutions should acknowledge that not all students will have the same career aspirations after entrepreneurship education. This study supports TPB by indicating a link between perceived behavioral control and entrepreneurial intentions.

As a result of this study, we gain a deeper understanding of how personality traits influence course outcomes, providing insights for both the theory and practice of entrepreneurship education. Personalized entrepreneurship education models that consider personality differences should be further explored to identify effective teaching methods or interventions that bridge the gap for students with lower entrepreneurial intention, ensuring impactful education for diverse student populations.

6. Conclusions

The results of this research provide valuable insights into the relationship between personality traits and the effectiveness of entrepreneurship education. There are significant implications for both theoretical frameworks and practice that can be drawn by tailoring entrepreneurship education to build entrepreneurial intentions based on personality profiles. Governments, professors, organizations, employees, institutions, and policy makers can take advantage of this study's findings to tailor entrepreneurship programs and identify individuals who will gain more from entrepreneurial education, thereby influencing their entrepreneurial intention. Entrepreneurship can play a key role in the vitality of organizations. Employability and self-esteem increase as employees develop skills related to problem solving, recognition of opportunities, presentation, and knowledge of business functions (finance, marketing, human resources, and operations). The new principles they learn in entrepreneurship programs can not only be applied in their organizations but also be implemented by employees as part of their decision-making process (Galvão et al., 2020). Employees can learn to solve problems, respond to new opportunities, and be creative.

According to the findings of this study, individuals with entrepreneurial personalities may demonstrate higher levels of entrepreneurial intention after participating in an entrepreneurship course. It is likely that these individuals will have an increased chance of being recruited by organizations because they are more qualified to hold leading positions. Leaders can be identified early, and a leadership pipeline can be formed, thereby preventing talent shortages (Tsaknis et al., 2024a). As companies recognize the value of entrepreneurship education, they should partner with educational institutions to tailor programs to trainee needs.

There have been few studies examining personality traits' effects on the effectiveness of entrepreneurship programs. Research on the personalities of individuals who would benefit most from entrepreneurship education is scarce (Fairlie & Holleran, 2012). The results of this study are subject to some limitations. One such limitation is the lack of attention given to issues related to gender, age, prior employment, and previous entrepreneurship training. Furthermore, this study is limited to a Greek university sample; it would be more informative if the relationships were examined across diverse ethnicities. Moreover, there was no formal comparison of the characteristics of the full initial group of 430 participants with those who withdrew ($N = 115$) and those who completed the study ($N = 315$). Without this analysis, it is not possible to exclude the possibility that attrition introduced bias by disproportionately affecting certain demographic groups or individuals with specific personality traits or entrepreneurial intentions. In addition, it may be possible to enhance the methodological approach to improve the reliability and validity of the results. Expanding the sample size would improve the statistical power of the study and improve generalizability. The effectiveness of entrepreneurship educa-

tion can be further improved by incorporating longitudinal approaches or mixed-method designs when collecting data. Additionally, the study excluded other variables with demonstrated explanatory power for entrepreneurial intentions. It has been demonstrated that individuals trained for entrepreneurial roles are more effective and successful, better able to create and own businesses, and more likely to contribute to the well-being of society as a whole. Furthermore, perceived behavioral control, which reflects past experiences with the behavior, the acquired skills and knowledge, and anticipated obstacles, could be further examined in future studies. Investigating how specific interventions in entrepreneurship education enhance self-efficacy and resource accessibility could provide deeper insights regarding the strengthening of perceived behavioral control and its subsequent impact on entrepreneurial intentions (Kiriakidis, 2017).

Future research can take advantage of these limitations. It would be beneficial to examine gender, age, prior employment, and previous entrepreneurship training in order to gain a deeper understanding of the factors influencing the outcomes of entrepreneurship education. Expanding the sample across ethnicities with different cultural backgrounds would enhance the generalizability of the findings (for example, individuals from different cultural backgrounds may exhibit variations in how personality traits influence educational outcomes). It would also be valuable to take into account the potential biases introduced by attrition and incorporate other explanatory variables in order to better understand the complex dynamics of entrepreneurial intentions and educational effectiveness. Future studies should include a control group that does not receive entrepreneurship education. Including such a group would strengthen the causal inferences that can be drawn from the data. While agreeableness did not have a significant impact on the outcomes in this study, it would be valuable to further investigate such non-significant traits. A deeper understanding of how personality interacts with education could be gained by understanding why certain traits did not have a significant impact. Further research on personality and its role in educational outcomes is warranted to gain a more comprehensive understanding. Future studies could also adopt methodologies such as experimental or longitudinal designs to better capture the long-term effects of entrepreneurship education.

Author Contributions: Conceptualization, P.A.T. and A.G.S.; methodology, P.A.T., A.G.S., A.K. and S.K.; software, P.A.T., A.G.S., A.K. and S.K.; validation, P.A.T., A.G.S., A.K. and S.K.; formal analysis, P.A.T., A.G.S., A.K. and S.K.; investigation, P.A.T., A.G.S., A.K. and S.K.; resources, P.A.T., A.G.S., A.K. and S.K.; data curation, P.A.T., A.G.S., A.K. and S.K.; writing—original draft preparation, P.A.T., A.G.S., A.K. and S.K.; writing—review and editing, P.A.T., A.G.S., A.K. and S.K.; visualization, P.A.T., A.G.S., A.K. and S.K.; supervision, A.G.S.; project administration, P.A.T., A.G.S.; funding acquisition, A.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This research was conducted as part of a postdoctoral study and was approved in accordance with the regulations of the Department of Business Administration at the University of West Attica. Ethical oversight was provided by the department's internal convention, which adheres to the principles of the Declaration of Helsinki. The specific approval details are maintained by the department, as the study did not require formal approval by an external Institutional Review Board.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Conflicts of Interest: The authors declare no conflicts of interest.

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