PERSONALISED BEHAVIOURAL FINANCE WITHIN THE EUROPEAN MARKETS IN FINANCIAL INSTRUMENTS DIRECTIVE II FRAMEWORK: A MULTILAYERED ANALYSIS

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Abstract

This article explores how behavioural, psychological, and socio-demographic factors interact in shaping financial decision-making (FDM) within the framework of the European Markets in Financial Instruments Directive II (MiFID II). The objective is to define a personalised model of behavioural finance that aligns with MiFID II's requirement for investor profiling and transparent advice. A total of 155 participants (aged 18–60) completed online questionnaires assessing financial literacy − divided into knowledge, behaviour, and attitude − together with psychological measures of impulsiveness, time perspective, behavioural activation/inhibition systems, and temperament traits. Gender differences and relationships among these variables were examined through t-tests, MANOVAs, and chi-square analyses. Results revealed that men scored higher in financial knowledge and literacy, whereas women exhibited higher behavioural inhibition. Temperament types influenced impulsiveness and time *perspectives: Rationalists appeared less impulsive and more future-oriented, while Idealists and Artisans were more hedonistic and risk-seeking. Higher financial literacy was associated with more cautious investment decisions and a preference for low-risk portfolios, supporting the idea that knowledge enhances prudence rather than risk tolerance. These findings highlight the importance of multilayered profiling that integrates behavioural, psychological, and socio-demographic dimensions to improve personalised financial advice. The study concludes that the implementation of MiFID II should incorporate these multidimensional insights to foster informed, responsible, and tailored financial decision-making. Future research should extend this model by testing how such profiles influence real investment choices under uncertainty.*

Keywords: Behavioural Finance; Financial Literacy; Gender Differences; MIFID II; Network.

1. Introduction

Financial decision making (FDM) is a high-level financial process characterised by uncertainty and risk of choices, since the potential gains or losses are not known in advance and the scenarios may even hide a fraud (Danesin et al., 2022). The process encompasses a range of activities that require adequate skills to make informed decisions. Therefore, the decision-maker is supposed to be able to assess and plan for the short and long term, identify risks, evaluate investments, and manage their resources. However, the continuous evolution of instruments and ways through which financial resources can be accessed makes FDM even more complex (Ventre et al., 2024; Joo and Durri, 2015).

In order to improve the quality of financial decisions, traditional analysis based on classical finance has been joined by a relatively new branch of research, i.e. behavioural finance. The latter investigates how behavioural, emotional, and cognitive factors can influence FDM. In particular, the aim of behavioural finance is to understand which preferences deviate from the rationality as assumed by classical models.

The integration of the processes investigated by cognitive psychology has contributed to describe some systematic errors made by decision-makers, as well as the mitigation effect of becoming aware of these errors on FDM. Furthermore, by giving weight to individual characteristics, the affirmation of personality theory in behavioural finance has introduced the concept of personalisation of strategies (Cervellati, 2017), whereby FDM is contextualised to the specific needs and features of the individual.

The combination of complex financial decision-making and personalised behavioural finance is embodied in the European Union's MIFID II Directive (see below), whose aim is to protect investors and promote greater market transparency. Indeed, MIFID II requires to act in the best interest of the client, through transparent advice that facilitates a full understanding of the elements involved and ensures informed and cognisant choices. With respect to behavioural finance, on the other hand, MIFID II imposes client assessment, i.e. profiling, to identify the most suitable strategies by simultaneously considering the client's psychological aspects, the individual needs and requirements, the ability to tolerate risk and the characteristics of financial instruments (Ganassin, 2016). In this process, it is also crucial to consider that the level of financial literacy of clients is indispensable to effectively communicate individual needs, understand financial products and advice. Therefore, while MIFID II imposes transparency and protection, financial literacy enables the client to reap the benefits of the regulation. In this regard, it is important to emphasise that the term financial literacy "includes dimensions in which individuals must have skills and the confidence to use their financial knowledge in depth to make financial decisions" (Budiman et al., 2024). In general, the degree of financial literacy is obtained by simultaneously considering the degree of Financial Knowledge (FK), Financial Behaviour (FB), and Financial Attitude (FA). FK refers to the culture of tools and basic notions, indispensable for informed and conscious choices; FB relates to the concrete relationships that individuals undertake and includes actions such as spending, planning, saving, debt management; FA, finally, comprises the set of beliefs and values that an individual has with respect to financial matters.

Recent studies (e.g., Ventre et al., 2024) suggest that interventions aimed at increasing financial literacy need to address all the above aspects, as only through a simultaneous combination of FK, FB and FA it will be possible to improve the quality of individual choices. Recently, Widagdo and Roz (2022) examined the influence of personality traits, financial literacy and behaviour on investment intentions in a sample of young students, and observed that an opened personality, adequate financial knowledge and behaviour had a positive effect on investment intentions.

In this context, however, given the complexity of the dimensions to be considered, previous paper rarely integrates FK-FB-FA with psychological traits (e.g., impulsivity, time perspective, temperament) and socio-demographic data into a single profiling model that is consistent and usable for MiFID II purposes. As a result, customer profiling assessments are often based on fragmented information that cannot fully explain or predict investors' choices.

The present paper aims at exploring such interactions in a sample with a large age span (18-60 years), by a multi-layered analysis of several levels of investigation to address the gap observed before by conducting a multilevel analysis that jointly considers:

(i) socio-demographic data (marital status, education, gender),
(ii) financial literacy broken down into FK, FB, and FA, and
(iii) psychological characteristics (impulsivity, time perspective on past-present-future, temperament traits).

These levels are integrated with responses to the MiFID II questionnaire (investment objectives, risk appetite, knowledge/experience) to derive multi-layered investor profiles that reflect the real complexity of decision-makers.

Therefore, the present study contributes to the literature on personalised behavioural finance in combination with MIFID II to support the definition of multi-layered profiles, based on the complexity of the decision-maker. Considering the objectives of MIFID II in the context of behavioural finance, it is expected that results would support the evidence of a layered perspective in FDM including cognitive, behavioural as well as social and cultural aspects.

The findings prove that the layered framework that unifies socio-demographic data, FK-FB-FA, and psychological traits, explicitly mapped to MiFID II suitability, can be a tool to support transparent and personalized advice and can guide interventions that jointly develop FK, FB, and FA.

2. Literature Review

Over the years, various historical events have shifted the focus from the financial environment to the financial environmental agent (Rao and Lakkol, 2022). In this context, the second version of MiFID introduced tools aimed at improving customer protection in the European market through profiling activities that allow financial advisors to choose the type of investment to recommend to customers (Gorgoglione, 2011).

Through classical and behavioral finance, it is possible to extrapolate five main classes to create a customer profile: socio-demographic characteristics, experience and knowledge, financial situation, risk tolerance, and investment objective (Ganassin, 2016). However, the way in which all this information is organized, and how comparing attributes that are not akin remains complex and unstructured. Furthermore, a more in-depth analysis of MiFID reveals that it is not enough to collect information to create a client profile: the client must understand the risks associated with the investment, and the responsibility for the investment cannot be reduced to a personalized recommendation alone. Therefore, this research also includes three other parameters in customer profiling: uncertainty, because it represents the way investors perceive the future (Geng et al., 2022); unknown risk, which, according to Pompian's definition (Pompian, 2016, pp. 4-5), is at the root of behavioral problems; customer-expert asymmetry because "Investors make decisions based on experience and knowledge on the stock market (...) investors act and *interpret* information to make investment decisions." (Suresh, 2024).

The combination of these elements is fundamental in defining a customer profile, not only to understand what the best solution for the customer is, but also to understand what the best way is to present the solution.

However, despite the great attention paid to behavioral finance (in all its nuances) and the interest in including its results in the profiling described by MiFID II, there is still no integrated model that jointly links elements such as the multiple dimensions of financial literacy (Martino et al., 2024), psychological traits, and investor profiles with variables such as knowledge, experience, objectives, and risk appetite.

The most recent surveys document that literacy levels are essential for the empowerment of individuals and for supporting the financial well-being of individuals and societies (OECD, 2023). At the same time, the EU has released a shared skills framework for adults (European Union/OECD, 2022) that specifies "what" to measure, but not "how" to integrate these skills into MiFID II objectives.

On the psychological front, the literature shows robust associations between personality traits, psychological constructs, and investment choices (Rao and Lakkol, 2022); however, these findings are not well contextualized to the concrete definition of profiling. Even when psychology enters market tools, implementation is mostly focused only on a specific trait (van Dolder et al., 2024; Munoz-Munoz et al., 2025; Sekścińska et al., 2025; Fernandez et al., 2023; Gonzalez, 2019). Modern financial decision-making is increasingly shaped by the convergence of psychological biases, technological affordances, and socio-cultural factors. Cognitive distortions such as overconfidence and loss aversion, reinforced by emotional and social feedback, promote excessive risk-taking and impulsive trading (Rizky Amin et al., 2025; Musso, 2024). At the same time, demographic and cultural factors modulate how these biases manifest. Younger investors, characterized by higher digital literacy and risk tolerance, are more prone to speculative and cryptocurrency trading (An et al., 2024), while socioeconomic status influences the complexity and diversity of investment strategies (Muktadir-Al-Mukit, 2022). Together, these findings suggest that financial decision-making in digital markets cannot be understood solely through rational or economic models. Instead, it emerges from a dynamic interaction of cognitive biases, emotional reinforcement, and social-technological structures. Recognizing these interdependencies is essential for developing evidence-based strategies to promote informed decision-making, mitigate risk, and maintain market stability in an era where investing increasingly mirrors gambling (Amin et al., 2025).

Nonetheless, financial decision-making is often associated with personality, defined as a constellation of characteristic patterns of thought, emotion, and behavior, being a key individual differences variable in psychology (*e.g.,* Eysenck, 1947; Gray, 1987; Keidel et al., 2021). Impulsiveness in financial choices, however, has shown inconsistent results. For instance, even if it has been claimed that impulsiveness could lead to steeper discounting (Reimers et al., 2009; Moreira & Barbosa, 2019), recent evidence suggests that, when the risk is paired with uncertainty (*i.e.,* defined as time-dependent variable, such obtaining the expected reward in days or months in the future), decision-makers tend to be more patient, slowing the discounting (Ventre et al., 2025). Not only impulsive behaviors, but also inhibitory abilities may play a role in financial decision making: for example, different studies have suggested a link between the ability to stop interferences and the discounting rate in economic decisions (Sthal et al., 2014; Lawyer and Mahoney, 2018; Harden et al., 2017). However, other studies did not support this result (*e.g.,* Urošević et al., 2016), suggesting that more research is needed, particularly with larger samples and more sophisticated analysis (Harden et al., 2017).

Financial decisions are also bound to how humans prospect the past, the present, and the future. Recent work in behavioral economics highlights the role of temporal cognition in shaping financial behavior. Beyond traditional notions of financial literacy, individual differences in time perspective (as measured by the Zimbardo Time Perspective Inventory) emerge as key predictors of financial health. According to Zimbardo and colleagues (2017), individuals with Present-Hedonistic or Present-Fatalistic orientations tend to exhibit impulsive spending, higher debt, and limited planning, while those with a Future orientation generally display more disciplined financial habits, albeit sometimes accompanied by overconfidence and speculative tendencies.

The highest levels of financial well-being are observed among individuals with a Balanced Time Perspective, who flexibly integrate past, present, and future considerations. Importantly, time perspective profiles predict financial outcomes more effectively than financial knowledge or numeracy (Da Lama & Brenlla, 2023), underscoring the need for educational interventions that target temporal awareness and self-regulation in decision-making (Zimbardo et al., 2017).

On the regulatory side, the ESMA Guidelines (ESMA, 2022) clearly define what to collect for suitability but do not specify how to systematically integrate literacy and psychology into actionable profiles.

Based on what has been said so far, the present paper proposes to test a multilevel framework that combines socio-demographics, FL dimensions, and psychological traits projected directly onto the three suitability dimensions, generating personalized profiles that can be used in investor advice and protection practices.

3. Materials and Method

This study is part of a broader research project examining individual preferences within the financial domain (including investments, business ventures, or funding) and the impact of various psychological factors on these preferences. This paper specifically addresses the multilayered analysis concerning gender, personal attributes related to daily life (e.g., general income, economic status, and ability to save money), psychological characteristics, financial knowledge, financial attitudes, and financial behaviour.

3.1 Participants and Experimental Design

In a within-subject design, all participants completed all tasks and questionnaires on an online platform (Vercel.com). A snowball sampling method implemented on social media (Facebook and WhatsApp) and online groups was adopted for data collection. The minimum required sample size was determined through an a priori power analysis using G*Power (version 3.1.9.7) with a medium effect size (w = 0.30) and an alpha of 0.05, which indicated that a sample of 117 participants was necessary to achieve a power of 0.90. Out of 182 participants initially enrolled, 27 were excluded since they did not complete the whole questionnaires; the final sample included 155 volunteers (78 males), aged 18–60 years (M = 28.1, SD = 7.83). For all of them, sociodemographic data were collected, as well as some information about social and financial status (Table 1). Participants were informed that the experiment aimed to investigate individual preferences in financial contexts, such as investments and funding, and how these are influenced by certain psychological factors. Subsequently, they provided their written informed consent. All procedures were conducted in accordance with the 1975 Helsinki Declaration and approved by the Ethics Committee of the Department of Psychology at the University of Campania 'Luigi Vanvitelli' (approval n. 5/2023).

Table 1 – Demographic features of the final sample (n= 155)

Gender	M 42.67%	F 57.33%				
Occupation	Employed 49.35%	Unemployed 10.39%	Inactive 40.26%			
Level of education	Elementary School 0.65%	Middle School 1.95%	High School Degree 31.17%	Bachelor's Degree 29.87%	Master's Degree or more 36.36%	
Family income	Myself 14.94%	Partner 5.19%	Parent 68.83%	Son/ Daughter 3.25%	I live alone 2.6%	Other 5.19%
Ability to save money	Yes 42.86%	No 16.23%	No income 40.91%			

Source: Authors' analysis

3.2 Financial Literacy

This section included a revised questionnaire developed by the Bank of Italy (D'Alessio et al., 2020), following the methodology outlined by the Organisation for Economic Co-operation and Development-International Network of Financial Education (OECD-INFE).

The questionnaire aimed to assess financial literacy levels within the Italian population and to compare these levels to other OECD samples. Two additional items were added to evaluate participants' ability to interpret data graphs. The questionnaire is divided into three dimensions: financial knowledge, financial behaviour, and financial attitudes. The financial knowledge scale assesses basic financial knowledge (e.g., inflation, interest rates, and risk diversification) with a score range of 0–9. The behaviour scale evaluates financial resource management in the short- and long-term (e.g., setting financial objectives, bill payments, and recent savings) with a score range of 0–9. The attitudes scale measures individuals' orientation towards saving, particularly for precautionary purposes, with a score range of 0–5. The overall financial competence indicator is the sum of scores across the three scales, with higher scores indicating greater financial literacy.

Even if in D’Alessio et al. (2020) participants were categorized into four classes through k-means classification algorithm, here the participants were distinguished based on whether they scored below or above this average, as the present study does not aim to classify individuals but rather to compare their scores to the Italian mean (11.9).

3.3 MIFID II profiling

Markets in Financial Instruments and Amending Directive 2002/92/EC and Directive 2011/61/EU (MIFID II), 2014] is a European directive whose purpose is to protect investors from non-optimal investments and activities, through a profiling-based analysis on individuals’ financial characteristics. To the aim of this study, three questions from MIFID II questionnaire have been extracted, one concerning investment’s purpose (*“What is the reason for which you invest?”*) and two on risk propensity, the first one about portfolios selections (*“After you make an investment, the value of your portfolio drops unexpectedly by 30%. What would you do in this case?”*) and the second one about potential portfolio loss (*“Knowing that the return on an investment is often linked to its exposure to risk, which investment strategy do you prefer?”*). These MIFID II questions have been selected since they are the most informative regarding the aspects addressed by the present study.

3.4 Barratt Impulsiveness Scale

The Barratt Impulsiveness Scale (BIS-11; Patton et al., 1995) is a 30-item self-report questionnaire scored on a 4-point Likert scale, measuring impulsiveness across three subscales: Attentional Impulsiveness, Motor Impulsiveness, and Non-Planning Impulsiveness. The total BIS-11 score ranges from 30 to 120.

3.5 Keirsey Temperament Sorter II

The Keirsey Temperament Sorter II (KTS-II; Keirsey & Bates, 1984) is a forced-choice measure based on Jungian temperament traits (Extraversion/Introversion, Sensing/Intuition, Thinking/Feeling, and Judging/Perceiving). The KTS-II identifies four personality types: Guardian, Artisan, Rationalist, and Idealist, across 16 items.

3.6 Behavioural Inhibition/Activation System Scale

The BIS/BAS scale (Carver & White, 1994; Italian version: Leone et al., 2002) is a 20-item self-report measure scored on a 4-point Likert scale. It includes the BIS scale, which assesses behavioural and emotional responses to punishment (7 items), and the BAS scale, which includes three subscales (Reward Responsiveness, Fun Seeking, and Drive) to evaluate responses to rewards.

3.7 Zimbardo's Time Perspective Inventory

The ZTPI (Zimbardo & Boyd, 1999) is a 5-point Likert scale self-report measure with five subscales: Past-Positive, Past-Negative, Present-Hedonistic, Present-Fatalistic, and Future. Carelli et al. (2011) reorganized the Future scale into two subscales: Future-Positive and Future-Negative.

3.8 Statistical Analyses

T-tests for independent samples were conducted to compare gender (male vs female) on financial literacy, ZTPI, BIS-11 and BIS/BAS scales. Multiple Multivariate Analysis of Variance (MANOVA) tests were conducted for the primary KTS-II types to determine differences on ZTPI, BIS-11, and BIS/BAS scores. ANOVAs were also performed to compare responses at MIFID II on financial literacy. Additionally, several two-way Chi-Square tests were performed to assess the relationship between gender and primary KTS-II types and variables such as education level (primary, middle, high school, bachelor's, and master's degree), occupation (employed, unemployed, inactive), hypothetical investment reasons, investment time, investment skills (both about risk and resilience situations), general and family income, saving attitudes, and financial literacy (Table 1). The significance level was set at 0.05, with interpretation based on standardized residuals (absolute values >1.96 indicating significant associations).

4. Results

4.1 Gender

T-tests showed that male and female significantly differed on Financial Knowledge (FK) and general Financial Literacy (FL) scores (Table 2). Specifically, male participants exhibited higher scores on FK; the same result was observed on FL, where male participants scored significantly higher than the female counterpart. Financial Behaviour (FB) and Financial Attitude (FA) showed non-significant differences in gender comparison. Hence, males seemed to be more familiar with financial dynamics, and more competent in financial decision-making. However, contextualising results to FK and FL maximum scores, participants' means could be considered medium-low both for FK and for FL.

Another interesting gender-related difference was observed on BIS/BAS scale, as female participants showed higher scores on BIS scale compared to male, with a stronger tendency to be worried about hypothetical punishment. No significant differences in gender comparison was found regarding ZTPI and BIS-11.

Table 2 – Values of Financial Knowledge, Financial Literacy, and impulsivity (BIS/BAS) as a function of gender, and related statistical comparisons

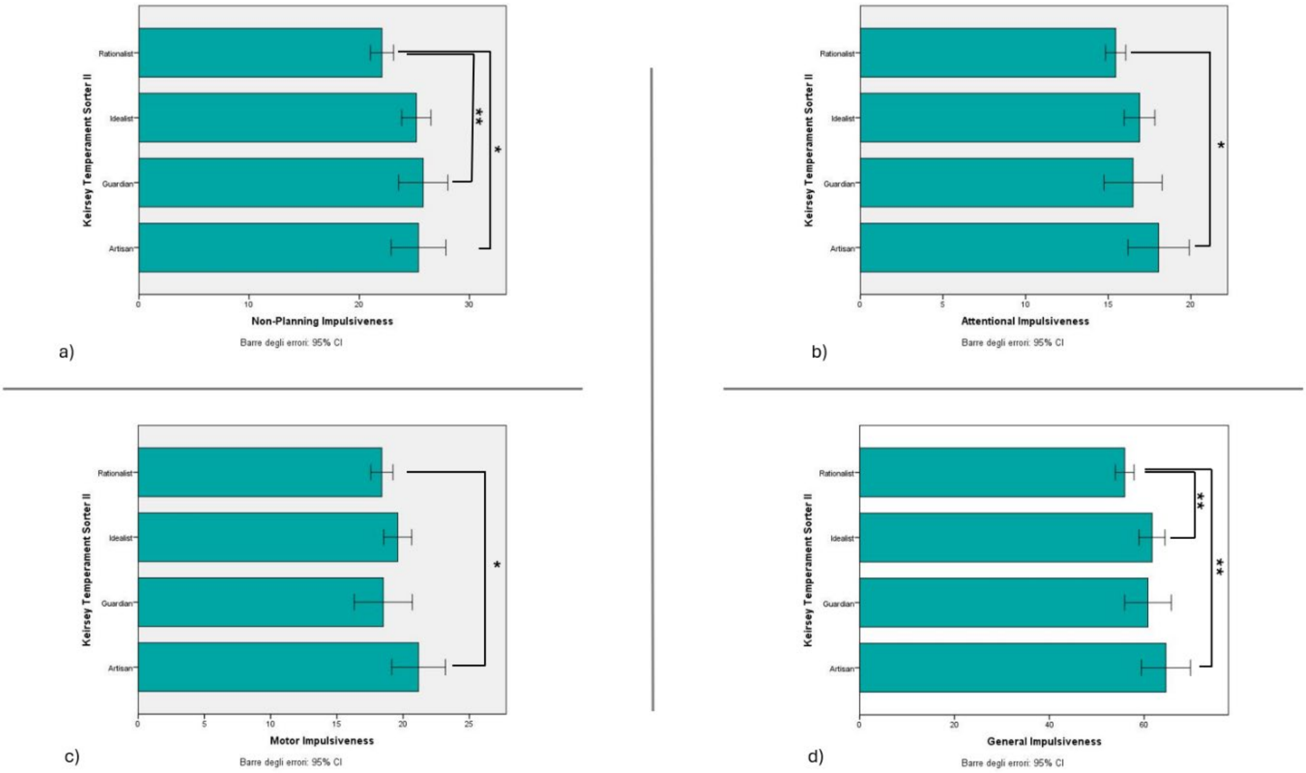
Measure	Gender	Mean	Standard Deviation	t-value (t), p-value (p)
Financial Knowledge	Male	5.32	3.37	t(152)=4.2, p<0.001
	Female	2.93	3.59	
Financial Literacy	Male	12.5	5.32	t(152)=2.47, p=0.014
	Female	10.35	5.30	
BIS/BAS scale	Male	22.35	3.5	t(152)=-3.12, p=0.002
	Female	24.25	3.87	

Source: Authors' analysis

4.2 KTS II

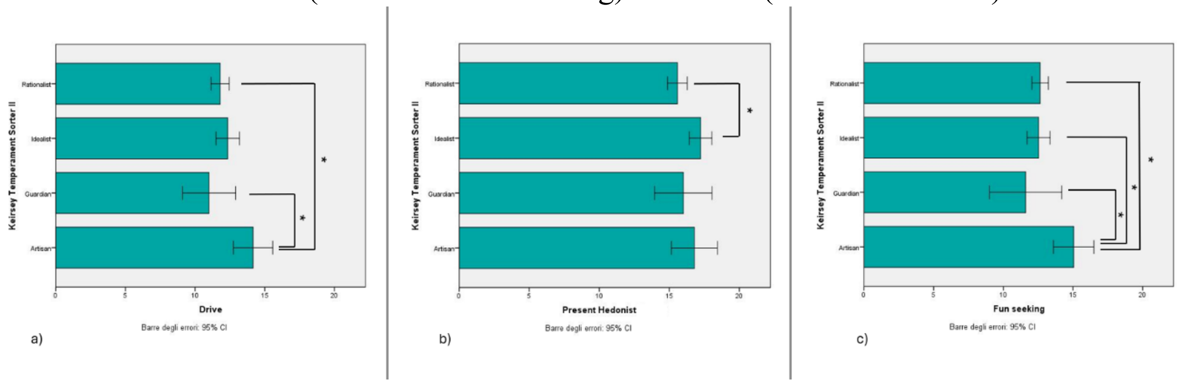
Keirsey analysis exhibited interesting implications on ZTPI, BIS-11 and BIS/BAS scales. Results are shown in Figures 1 and 2. Regarding ZTPI, participants' Keirsey first characteristic showed an influence on Hedonistic Present (F(3, 150)=3.3, p=0.022). In particular, Idealists presented higher scores on Hedonistic Present compared to Rationalists, showing a more pronounced tendency to live the present without planning future and its consequences (Figure 2). This is in line with the scores obtained on BIS-11 (Figure 1), which Keirsey first characteristic has shown an influence on all the subscales: Attentional Impulsiveness (F(3, 150) = 4.48, p = 0.05), Non-Planning Impulsiveness (F(3, 150)=6.25, p=0.001), Motor Impulsiveness (F(3, 150) = 3.13, p = 0.027) and BIS-11 total score (F(3, 150)=6.47, p<0.001). Idealists presented higher scores on the total BIS-11 scale, and on Non-Planning Impulsiveness subscale, compared to Rationalists. Moreover, Artisans exhibited higher ratings on BIS-11 total scores, Attentional Impulsiveness, Non-Planning Impulsiveness, and Motor Impulsiveness compared to Rationalists. From here emerges that KTS-II could identify more or less impulsive attitudes, depending on the main individual type. BIS/BAS scales results confirmed this observation, since the main characteristic demonstrated an influence on Fun Seeking (F(3, 150)=4.78, p=0.003) and Drive (F(3, 150) = 3.9, p = 0.010). In particular, Artisans showed higher scores on Fun Seeking compared to Guardian, Idealists and Rationalists. Concerning Drive, Artisans again showed higher rating compared to Guardian and Rationalists.

Figure 1 – Keirsey's main types (Artisan, Rationalist, Guardian and Idealist) comparison for BIS-11 general scores and its subscales



Note: a) Non-Planning Impulsiveness; b) Attentional Impulsiveness; c) Motor Impulsiveness; d) BIS-11 total score. Bars indicate standard errors from mean; ** for p<.01, * for p<.05
Source: Authors' analysis

Figure 2 – Keirsey's main types (Artisan, Rationalist, Guardian and Idealist) comparison for BIS/BAS subscales (Drive and Fun Seeking) and ZTPI (Hedonist Present).



Note: a) Drive; b) Fun Seeking; c) Hedonist Present. Bars indicate standard errors from mean; * for p<.05
Source: Authors' analysis

4.3 MIFID II profiling

Participants' choices about portfolio losses and portfolio selection differed as a function of their financial literacy (Table 3). Indeed, a significant difference was observed about FK and FL. In particular, when participants fell in the "I do not invest" choice, in terms of being inactive as investors, they scored lower in FL compared to "I'd keep investing" people. This result highlights participants' lack of competence, given their scores in FL rating. Moreover, there was a significant difference on portfolio selection, both on FK and FL. In this case, "low risk portfolio" and "medium-low risk portfolio" participants exhibited higher level of FK compared to "high-risk portfolio" participants. Higher levels of FL were observed in "very-low", "low" and "medium" risk portfolio participants, compared to the ones who chose "high-risk" portfolio.

Table 3 – Results of the ANOVA and post-hoc comparisons considering MiFID-II measures over financial literacy

MIFID II	FL subcategories (F, p value)	Post-hoc comparison	Mean	Standard Deviation	Comparison (p value)
Question 1	FL (F(3, 150)= 5,37, p=0.002	I do not invest participants	9.8	5.4	vs. I would keep investing: 0.002
		I would keep investing participants	14.57	5.16	-
Question 2	FK(F(3, 150) =3.9, p=0.010)	Low-risk	4.73	3.25	vs. high-risk: 0.008
					vs. high-risk: 0.04
		Medium /low-risk	4.25	3.23	-
		High-risk	1.22	4.85	
Question 2	FL(F(3,150)= 5.12, p=0.002)	Very low-risk	11.1	5.41	vs.high-risk: 0.02
					vs.high-risk: 0.001
		Low-risk	12.35	4.59	vs.high-risk: 0.007
					-
		Medium/low risk	11.62	5.23	
		High-risk	6.32	6.5	

Source: Authors' analysis

Note: Question 1*: "After you make an investment, the value of your portfolio drops unexpectedly by 30%. What would you do in this case?";* Question 2: *"Knowing that the return on an investment is often linked to its exposure to risk, which investment strategy do you prefer?"*

4.4 Chi-Square analysis

To develop further the multilayered net, chi-square analyses were performed to detect any relationship between the categorial variables investigated in the questionnaires. First, there was an interesting relationship between financial literacy subscales (FK, FB and FA) and gender ($\chi 2$ (4, N = 155) = 20.31, p < 0.001). Specifically, women were more performing in FA, while men in FK (confirming previous results for Financial Knowledge subscale). Furthermore, results showed a significant relationship between gender and education level, (χ^2 (10, N = 155) = 164.71, p < 0.001). In particular, master's degree is more common among female participants while, for male participants, high school diploma was more common. Again, a significant relationship was found also for gender and the question about “who has the highest income in your family?” ($\chi2$ (12, N = 155) = 169.67, $p < 0.001$). Specifically, men in our sample were more economically independent compared to women, whose highest income was from one of their parents. KTS-II’s main types showed a significant relationship with the questions regarding attention to spending ($\chi2$ (28, N = 155) = 184.62, $p < 0.001$), long-term savings ($\chi2$ (28, N = 155) = 198, $p < 0.001$), and investment purposes ($\chi2$ (20, N = 155) = 178.15, $p < 0.001$).

Idealists, Rationalists and Artisans presented an average preference regarding attention to spending, while Guardians did not. However, Guardians, as well as Idealists, presented a medium-high tendency to long-term savings, while Artisans had a little interest in saving for a long run. Concerning investment purposes, Artisans and Rationalists tended to invest to seize a (financial) opportunity, while Guardians preferred the option “I do not invest”. Ultimately, regarding MIFID II questions about risk, it seems that there was a relationship between Keirsey profiles and the choices after portfolio dropping ($\chi2$ (16, N = 155) = 165.53, $p < 0.001$) and between Keirsey profiles and portfolio choices ($\chi2$ (16, N = 155) = 162.73, $p < 0.001$). However, the sample did not present a tendency towards one or more specific choices, so it is not possible to define a direction.

5. Discussion

This study aimed to define a multilayered net between several different variables in the FDM context. To do this, several analyses were performed in order to define a potential presence of relationships among the abovementioned aspects.

5.1 Gender seems pivotal in orienting Financial Literacy abilities and Behavioural Inhibition System

Women and men seem to differ significantly in Financial Literacy. The results highlight that men scored more on Financial Literacy possibly providing them with and advantage when facing financial decision-making. Projecting the scores on FL subscales, it seems the Knowledge (Financial Knowledge, FK) makes the difference, since both Behaviour and Attitude (even though women presented a stronger bound with the latter) do not statistically differ between groups.

These results corroborate literature about gender differences on behavioural finance (Hasler and Lusardi, 2017). Still, scores on all the three different categories attest to medium-low degrees: this is important, since it cannot be assumed that participant sample is actually capable in dealing with financial matters. This is not something related to a (poor) cultural or educational background, considering that most of the participants in the sample obtained at least the bachelor’s degree, and master’s degree was statistically more present among females than males. This is important especially if contextualised to the evaluation of economic independence, or individual outcomes, as females in our sample were less economically independent than men, often leaning on parents. Results are in line with financial research previously made regarding South Italy (Brown et al., 2022; Cutillo & Centra, 2017).

Concerning the inhibition and activation systems, results highlighted that women scored significantly higher on the BIS subscale, suggesting that female participants seem to be more sensitive to signals which indicate the presence of potential negative outcomes (Leone *et al.,* 2002). This finding is in line with previous studies showing that women seem to be more sensitive to punishment than men (Torrubia *et al.,* 2001; Castellà & Perez, 2004) and more focused on the environmental details, maximizing short-term gains to avoid heavier losses (Van de Bos *et al.,* 2013). The *fear of negative evaluation* (FNE), the sensation of being negatively evaluated by others (Gallego *et al.,* 2007), may explain this finding.

Previous evidence highlighted that FNE is linked to a tendency to make less risky decision (Lejuez *et al.,* 2003), and recent findings demonstrate that women perceive more FNE than men (Biolcati, 2017). In this sense, it is possible that the fear of a negative evaluation makes women more worried in taking decisions and focus more on environmental details to avoid negative outcomes; this then reflects a tendency in making less risky decisions. Anyway, there is no correlation between FL and BIS ratings, so it could not be possible to say that women's approach to punishment is someway related to their financial inadequacy. Therefore, it is possible that there is some other variable (not consider in this paper) which could give more insights on why women are less able than men in financial decision-making or maybe create a bound between these two phenomena.

Future studies should deepen the relationship between FNE, BIS and gender differences in decision-making.

5.2 Temperament types seem to be fundamental in defining impulsiveness behaviours

Rationalists tended to be less impulsive compared to Idealists and Artisans, and to cling less on today's pleasure, thinking more about what is coming in the near (and remote) future. This is in line with Keirsey's idea of Rationalists temperament, since they are shown as analytical and logical, enjoying solving complex problems and applying logic and reason to what they do.

Characterised by a tendency to be sceptical, pragmatic and independent, Rationalists are known for their logical skills and ability to solve problems quickly (Keirsey and Bates, 1984). In Pompian's terms, who has dealt with this temperament regarding behavioural finance field (Pompian, 2012, 2016), Rationalists can be also described as an "Independent profile": people who fall in this category tend to be more autonomous in financial decisions, and so they look deep in advantages and disadvantages of alternatives before making a choice. Financially, this is also the most difficult profile to convince investing, since they usually fall in confirmation bias about their own information and opinions, even though inappropriate (Pompian, 2012, 2016).

Considering scores on questionnaires used in this work, our results highlight these traits: participants showed a minor attitude towards impulsiveness, lower ratings on BAS scale and, since their "competence" in logical planning (Cervellati, 2017), they tend to seize opportunities more than other KTS' types. Compared to Rationalists, Idealists present almost the opposite profile: they are more prone to "live their life", do not think about consequences of their actions and are more impulsive than other KTS' types. As already mentioned in literature (Cervellati, 2017), Idealists usually do not care much about financial matters, since they do not consider money as primary goal in life, and generally do not aim at accumulating wealth. It is likely for them accepting financial advice from people they trust, even though the latter are not experts, and so Pompian put them into the "Follower profile" (Pompian, 2012, 2016).

This study confirms that, since they obtained the highest score on Hedonistic Present, they do not have financial future plans, and compared to Rationalists they are lot more impulsive. Lastly, there are Artisans. This is an interesting category: they scored high on general BIS-11, Fun Seeking and on Drive, highlighting a strong propensity for rewarding opportunities and the tendency to pursue appetitive-type goals (Carver & White, 1994). This in line with behavioural finance literature that have dealt with Keirsey's profiles (Keirsey and Bates, 1984), since Artisans do not like planning, focus on short-terms goals and prefer immediate gratifications (e.g., Cervellati, 2017). Pompian (2012, 2016) describes them as “accumulators”, since they tend to have a high interest for money, presenting “the urge of act” financially and being more prone to emotional biases. One may think, as per their innate characteristics, an Artisan should focus more often on the present, showing high scores on Hedonistic or Fatalistic Present ZTPI subscales; however, it does not seem so: at least in this study, they did not differ from other Keirsey's types regarding Present subscales, nor they did regarding Future or Past subscales. Nonetheless, to the best of our knowledge, no studies in literature assessed relationships between the Time Perspectives and Keirsey's temperaments traits; therefore, the present findings warrant to be considered in further behavioural finance studies.

It is noteworthy that we did not find specific results for Guardians. This can be related to the low number of participants falling in that category.

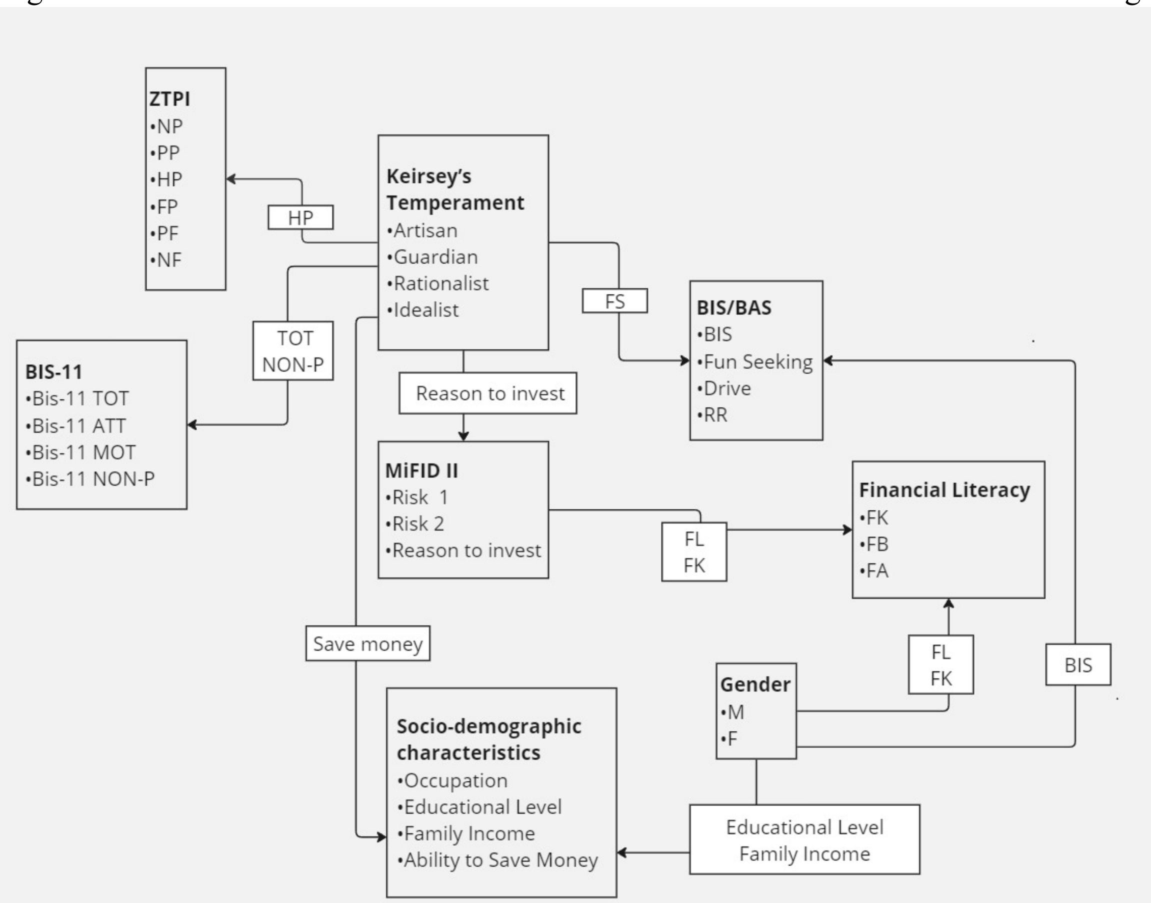
5.3 Portfolio selection and risk behaviour in MIFID II

The present findings showed that people with higher financial knowledge tend to be more cautious in deciding to keep investing when their hypothetical portfolio drops. This is interesting considering results obtain in portfolio selection, since people with higher financial literacy (of which financial knowledge is a sub-category) chose less risky, but also less rewarding, portfolios. This result highlights the fact that, even if there is knowledge, this does not mean that there is competence as well. Hence, to our participants, who got low-medium ratings in financial competence in general, investing is not a common activity, and so they tended to fall more on the “inactive” answer since they do not have enough competence to respond differently. This can explain the portfolio selection as well: since the competence is not really high among our participants, low-risk and medium-risk portfolios seemed more appetitive, since the risk perception was low too. There is also a relationship between these questions and Keirsey profiles, even though it was not possible to discriminate a specific direction.

The chi-square analysis revealed a significant association between Keirsey profiles and risk behaviour responses. The contingency table and adjusted residuals suggest specific patterns in the responses of different temperament types. For the "I'd do nothing" response, Guardians were significantly more likely than other temperament traits to choose to do nothing in response to the presented situation. Idealists also show a similar tendency, though to a lesser degree. For the "I do not invest" response, Rationalists presented a strong propensity to stay inactive even when the portfolio drops. This is in line with the idea that Rationalists “think, more than do” (Cervellati, 2017; Ventre et al., 2023 b). The overall distribution of responses indicates that participants' choices are not evenly distributed among temperament categories, reinforcing the idea that KTS' type significantly influences the responses given. The chi-square analysis revealed a significant association between Keirsey profile types and portfolio selection. Except for Guardians, who presented a more distributed tendency towards all the options provided, all participants who fell in the other categories (Artisans, Rationalists and Idealists) presented a (little) preference towards “low-risk” portfolios, regardless of the differences inherent in the temperament type. This is interesting, since it seems that the low-risk perception is somehow more important than the potential rewards of choosing a riskier portfolio. This could be related to the low scores obtained to the FL scale: since our participants do not present high financial competence, it can be assumed that they do not know how to manage a portfolio, so the attractiveness of a higher-risk deal might be blunted by the risk itself. Even though these results, when participants are asked not to choose a portfolio or how to deal with financial drop, but to decide between two different rewarding options, there is a flip over towards the most risk option (Ventre et al., 2025). This is interesting and probably confirms the framing effect (Kahneman & Tversky, 1979): changing the environmental conditions in which people have to make a choice, they could perform different even if the outcome could be considered the same.

To put together the results observed in our study and the previous research findings we provide a theoretical framework describing the many factors contributing to FDM to orient future empirical research on the topic. Figure 3 shows a schematic representation of the multilayered architecture of FDM where different factors are, either directly or indirectly, associated with the investment choice. This network representation enhances the peculiarity of the profiling required by MiFID II and the ambition of the present paper itself, which consisted in identifying a rather complex network, delivering the idea that centralising only one factor would detract from the simultaneous importance of all the others.

Figure 3 – A theoretical framework to understand FDM in the context of available findings



6. Conclusions

This present work has identified relationships between the various levels that could make up the decision-maker in the context of financial decision-making. Starting from the assumption that all the components of financial literacy are fundamental to the implementation of the European MiFID II directive, the present research turned to the simultaneous investigation of behavioural, socio-demographic, and psychological characteristics that could influence the decision-making process. Overall, our results are in line with previous research (Widagdo and Roz, 2022) but extend the available evidence by recruiting a sample covering a large lifespan and by targeting more closely the processes of portfolio selection and management as assessed by the MIFID II.

A natural development of such a model would be the inclusion of the choice profile, i.e. the inclusion of the individual decision to investigate how the relationships found here are distributed with respect to a financial choice. To do so, the intertemporal choice context would allow to test how individuals allocate their resources between present and future consumption in uncertain conditions. Therefore, combining the results discussed in *Section 4* with intertemporal choice (Read et al., 2018) would increase the expendability and practicality of the research.

In this regard, it is emphasised that the levels considered conform to the study of intertemporal choice behaviour. Several studies have applied the BIS-11 (Patton *et al.*, 1995) to delve into potential relationships between individuals' impulsiveness and the way in which people choose an option in a Delay Discounting (DD) Task, one of the most common ways to empirically study intertemporal choices (i.e., de Wit *et al.,* 2007; Kirby & Petry, 2004; Takashi, 2005; Baumann & Odum, 2012; Jauregi *et al.,* 2018; Ikegami & Sorama, 2023, Ventre *et al., 2025*) with mixed results. The absence of agreement should be likely due to the use of different populations or sample sizes used in the previous studies (Baumann & Odum, 2012). It should also be interesting to look at this relationship considering BIS-11 subscales, since they can assess different aspects of impulsiveness and not only a general measure of it (Osburn, 2000).

In addition, the Behavioural Activation System (BAS) and the Behavioural inhibition System (BIS) (Carver & White, 1994) has been used to assess impulsiveness in DD tasks too, considering a sort of unbalance among two opposite systems. Some studies have been performed comparing the effects of the two systems to DD tasks (Reiser *et al.,* 2019; Bakhshipour-Rudsari & Karimpour-Vazifehkhorani, 2021; Stam *et al.,* 2022; McQuaid *et al.,* 2022), with mixed results also in this case. The preference towards one or the other option in intertemporal choices has also been formalised as a synonymous with having a "foreshortened time horizon and considering only a limited period into the future" (Teuscher & Mitchell, 2011, pag. 2). Therefore, one's time perspectives can influence decision making, specifically if (waiting) time is part of the choice itself. Therefore, also Zimbardo Time Perspective Inventory could be used in the contexts of intertemporal choices. In particular, a study that investigated ZTPI and DD task has shown that steeper discounting was related to higher scores on the present subscales, and lower scores on the Future subscale (Daugherty & Brase, 2010). However, in Bumann & Odum's experiment (Baumann & Odum, 2012) this relationship has not been observed: delay discounting was not significantly related to the scores on the ZTPI subscales.

In our former work (Ventre et al., *2025*), we investigated the influence of the time dimension in subjective probability concerning risky intertemporal rewards with the same probability occurrence. It has been observed that the value of subjective probability is time dependent, i.e., equal probabilities are perceived differently when evaluated on different instants of time and, if put in front of an intertemporal choice, individuals tend to exhibit a patient behaviour (that is, they prefer Later Larger rewards compared to Sooner Smaller rewards and the Indifference option most of the time) (Ventre et al., 2025). Nonetheless, participants psychological characteristics have not been considered during the analysis process, even if, as said, should be crucial in understanding the way in which people make a choice. Therefore, as future research, the present results could be enriched with studies of intertemporal choices to be used in a decision support network for personalised advice according to MiFID II criteria (Martino and Ventre, 2023).

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