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Decoding the Financial Risk Puzzle: The Interplay of Biopsychosocial Indicators and Financial Literacy among Indian Investors

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Abstract. This study examined the influence of biopsychosocial indicators (personality type A\B, self-esteem, and sensation seeking) on the financial risk tolerance of individual investors, and the mediating effect of financial literacy. The present study used structured questionnaire to collect the data from 586 Indian retail investors and adopted the convenience sampling technique followed by snowball sampling. The results revealed that personality type, self-esteem, and sensation seeking play a significant and vital role in influencing financial risk tolerance. Financial literacy partially mediates the relationship between personality type, self-esteem, and risk tolerance. However, our analysis did not find any significant mediating effect of financial literacy in the relationship between sensation seeking and financial risk tolerance. These findings highlight the significance of psychology of an investor and thus provide a unique contribution to the financial risk tolerance literature.

Keywords: biopsychosocial indicators, sensation seeking, self-esteem, personality type A\B, financial risk tolerance

JEL Classification: G11, G41, O3

1. Introduction

Financial risk tolerance (FRT) pertains to investor's willingness to endure uncertain changes in their investment outcomes that differ from their expectations (Grable et al., 1999). FRT assumes a pivotal role in various contexts of financial decision making (Rai et al., 2021). For example, FRT affects individuals' routine debt-versus-savings decisions (Lawson et al., 2005), the mortgage choice (Grable, 1999), adoption and management of credit card (Campbell, 2006), long-term and short-term patterns of expenditure (Sung et al., 1996), purchasing of insurance (Shusha, 2017), and assets distribution (Nguyen et al., 2019). Furthermore, across the globe, financial advisors are mandated by financial regulatory bodies to conduct a client risk assessment before implementing any investment plans (Hari et al., 2018). Financial advisors in developed nations are obliged by law to undertake risk assessments of their clients (Wahl et al., 2020). Wealth managers in India have been urged by the regulatory bodies, such as the Securities Exchange Board of India (SEBI), to provide useful guidance to their clients by taking their risk aversion and financial goals into account. Therefore, wealth managers have a legal and ethical obligation to have an exhaustive and full awareness of their investor's FRT. However, risk and reward are considered one of the utmost important factors required for executing optimal portfolio selections, but the most significant and crucial factor is the knowledge of investors' risk tolerance level (Droms, 1987; Owusu et al., 2023). The development of investment strategies is dependent on a decision model with four essential inputs: objective, time horizon, financial stability, and an intricate FRT evaluation (Garman et al., 2011; Grable, 1999). Despite the simplicity and accessibility of the first three inputs for planners and managers, FRT is highly individualized and difficult to evaluate (Larkin et al., 2013). Because of this, a growing body of research has been conducted to better understand how an individual's tolerance for risking their current wealth in the hopes of growing it in the future may be utilized to create financial advising services that are specifically matched to their needs (Gibson et al., 2013).

Due to the multifaceted nature of FRT, it becomes challenging to measure it. It is inherently difficult to define and comprehend FRT, as it seems to be shaped by various predisposing factors, including demographic, environmental, and psychosocial factors (Sung et al., 1996). FRT has garnered significant attention from contemporary researchers due to its pivotal role in decision-making in the financial context (Rahman et al., 2019). Consequently, numerous studies have been conducted and documented in the existing literature, exploring various factors that influence FRT as well as its potential outcomes (Eker et al., 2010; Kannadhasan et al., 2016; Naqvi et al., 2020; Sachdeva et al., 2023). The existing body of literature indicates that demographic characteristics have been extensively studied as determinants of FRT (Choudhary et al., 2021; Larkin et al., 2013; Muktadir, 2020; Shah et al.,

2020; Shusha, 2017). Similarly, Mukhtar et al. (2023) explored the influence of dynamic personality traits on financial risk tolerance and discovered that financial self-efficacy, positive emotions, and resilience positively contribute to an investor's financial risk tolerance. However, it is important to acknowledge that there are various other factors that may also exert a substantial impact on determining an individual's FRT. These factors include an individual's personality, which falls under the realm of psychology, as well as their genetics, which is a biological aspect. After conducting a comprehensive literature review, it has been determined that there is a paucity of scholarly works that specifically address the role of diverse biopsychosocial factors in the assessment of FRT within the investor population. The biopsychosocial indicators (BPS) encompass a wide range of factors that have an impact on an individual's overall well-being and behaviour (Kannadhasan et al., 2016). These factors include demographic characteristics, social interactions, cultural influences, and an extensive range of personality traits as categorized by Irwin Jr (1993) in his infamous work *Adolescence and Risk Taking: How They Are Related*. After a thorough literature review, it has been deduced that the role of BPS indicators in FRT is underexplored. Therefore, the primary aim of this study is to examine the impact of BPS factors (personality type (PT), self-esteem (SE), sensation seeking (SS)), and investors' financial risk tolerance.

Financial literacy (FL) is an additional crucial factor that plays a substantial role in the investment decision making of the investor because it has the potential to link personality traits with FRT (Janor et al., 2016). Prior literature provides ample evidence to support the notion that FL involves the comprehension of financial terminology and mathematical proficiency (Awais et al., 2016). FL has been defined by Sharma (2020) as the capability to make sound financial decisions that take into account both immediate and long-term goals. The ramifications of lacking FL are substantial. Individuals who possess insufficient knowledge and understanding of financial matters are faced with challenges in adequately strategizing and preparing for their retirement (Bayar et al., 2020). As a result, they have less wealth as they approach retirement, which limits their ability to invest in stocks (Lusardi et al., 2020). Furthermore, these individuals are more likely to borrow at high interest rates (Awais et al., 2016). Therefore, the lack of adequate FL has a negative influence on investment decision-making, while a high level of FL has a substantial impact on the economic behaviour of an investor (Prasad et al., 2020). The possession of FL allows investors to anticipate and acknowledge adverse fluctuations, thereby suggesting that FL has the capacity to improve FRT (Anastasia et al., 2021). Prior literature has rigorously emphasized the importance of FL in determining an investor's FRT (Akhtar et al., 2023; Akims et al., 2023; Ansari et al., 2022; Cupák et al., 2022; Raut, 2020). However, the level of FL is also influenced by various individual and social factors. The current investigation focuses on how FL being the intervening

variable mediates the relationship between BPS indicators and the FRT of an individual investor. Nevertheless, the investigation of FL through mediation has not been adequately expounded upon in previous studies (Jain et al., 2022). Hence, the primary objective of this study is to examine the potential mediating role of financial literacy in the association between biopsychosocial factors and investors' financial risk tolerance. Although a number of studies (Grable et al., 2004; Kannadhasan et al., 2016; Kuzniak et al., 2017; Naqvi et al., 2020) have investigated the impact of BPS on FRT, they have not considered financial literacy as a mediating variable. To the researcher's understanding, the present study represents a novel attempt to analyse the association between BPS and FRT by considering FL as a potential mediator.

Based on the objectives, this study adopted mediation approach to thoroughly investigate the concept of BPS indicators, financial literacy, and FRT, which represents a novel attempt in this field by addressing literature and empirical gaps in prior literature. In the context of the emerging financial market, the current research will provide valuable insights into the behaviour of various stakeholders. In the context of behavioural finance, the present study introduces the mediating effects of financial literacy for the first time in understanding the established relationships between BPS and FRT within an emerging market economy such as India. The present study provides a significant contribution to the extant scholarly literature through an analysis of the various factors that influence individual investors' FRT. Therefore, individuals with the capability of evaluating and forecasting FRT can advance towards a theoretical framework that combines psychological and economic perspectives. This approach will enhance the comprehension of the attitudes and actions related to risk-taking exhibited by retail investors. The current research will provide valuable insights for financial advisors, policymakers, and researchers regarding the investors' levels of risk tolerance. This knowledge will enable them to make informed recommendations regarding suitable investment options for their clients.

The subsequent sections of the article are outlined as following: Section 2 presents a comprehensive overview of the theoretical framework that serves as the foundation for the study. The discussions within this section will aid in the formulation of hypotheses regarding the correlation between PT, SS, SE, and FRT with a particular emphasis on the potential mediating influence of FL. Section 3 outlines the research methodology utilized to collect data, describes how the constructs were measured, and elaborates on the analysis technique employed. In section 4, the research findings and results are presented. The author provides a thorough examination of the acquired findings in Section 5, emphasizing the importance of this research within the realm of behavioural finance, encompasses both theoretical and practical implications, elucidating the potential contributions of this research and the limitations of the study research.

2. Literature Review

2.1. The Role of Biopsychosocial Indicators in Investors' Financial Risk Tolerance

The understanding of personality traits is of paramount importance in comprehending the behavioural patterns of individuals when making decisions (Bucciol et al., 2017; Jain et al., 2022; Ozer et al., 2019; Rizvi et al., 2015). Personality traits are stable aspects of an individual's character that vary from one person to the next and can have a wide range of values (Thanki et al., 2020). Myers–Briggs Type Predictor (MBTI), Big Five Model, and Personality Type A and Type B are well-known personality trait models. According to the MBTI personality theory, individuals have inherent preferences that determine their behaviour in specific situations (Dhiman et al., 2018). Pak et al. (2015) suggested that investment advisors should take into account the personality type of investors for client profiling and for proposing appropriate investment alternatives. Barnewall (1987) suggests that advisers should familiarize themselves with the characteristics of their clients while recommending them investment alternatives. The primary objective of this study is to measure the impact of personality type on individuals' levels of FRT. The two personality types, A and B, exhibit contrasting characteristics, with the former displaying aggression, passion, and a constant sense of urgency, while the latter demonstrating a relaxed, contented, and unhurried demeanour (Carducci et al., 1998). Research findings indicate that individuals classified as type A exhibit a higher propensity for risk-taking compared to those classified as type B. Consequently, type A individuals exhibit higher levels of educational attainment, financial literacy, income, and occupational status (Parsaeemehr et al., 2013). There is a scarcity of research that has examined the correlation of personality type with financial risk tolerance by categorizing investors into type a and type b (Hallahan et al., 2004). Hence, the present study endeavours to address the existing gap in the literature by investigating the influence of PT on the FRT of individual investors.

Self-esteem is widely recognized as a fundamental multidimensional personality trait encompassing various dimensions such as skills, social competence, and self-perceived worth (Filosa et al., 2022). It is defined as an individual's perception and confidence in their own capability to possess the requisite skills and competencies needed to effectively achieve specific goals (Sekścińska et al., 2021). Furthermore, it illustrates an individual's perception of their self-worth (Yao et al., 2005). SE influences a person's portfolio allocation (Tang et al., 2016), wealth creation (Swarn Chatterjee et al., 2011), and trading behaviour (Kourtidis et al., 2017). Rosenberg (1965) argues that SE can be both positive and negative, i.e. constructive and destructive. Krueger Jr et al. (1994) found that individuals who had scored

higher on positive self-esteem tended to have more risk tolerance as compared to individuals who had scored high on negative self-esteem. Individuals with a positive self-esteem exhibit a sense of self-assurance, while those with a negative self-esteem tend to experience constant confusion and fear regarding potential outcomes (Naqvi et al., 2020). If, for example, investors experience a loss in their investments, those with high self-esteem react more positively than those with low self-esteem (Arkes et al., 1985). Also, individuals with a high self-esteem tend to refrain from experiencing regret upon encountering losses, as such outcomes are likely to diminish their self-esteem, which is regarded as a valuable attribute (Thanki et al., 2014; Yao et al., 2005). Upon analysing demographic variables, it has been observed that males with a positive self-esteem tend to participate in trading activities more frequently and excessively compared to females. Mansour et al. (2006) found that there existed a tendency of women to exhibit higher levels of pessimism compared to men, and they tended to employ strategies to counteract the decline in their self-esteem following investment failures. Grable et al. (1999) highlight that investors with a positive self-esteem tend to actively engage in the acquisition of financial knowledge and actively seek financial advice. The acquisition of financial education helps people to understand and manage their finances according to their preferences (Pinjisakikool, 2017).

Sensation seeking is an additional trait that has consistently demonstrated a relationship with FRT (Harlow et al., 1990; Rabbani et al., 2020). SS refers to an individual's propensity to seek out diverse, fresh, and intricate sensations and experiences, coupled with their readiness to undertake physical or social risks (Zuckerman, 1994). This behaviour can be explained by biological processes taking place in the brain (Anitei, 2014). The concept of SS behaviour is often characterized as a form of risk-taking behaviour (Zaleski, 1984). Carducci et al. (1998) in their study reported a significant and positive correlation between SS and the frequency of engagement in risky behaviours, commonly referred to as the financial risk tolerance. Further, the researchers discovered that engaging in financial risk-taking behaviour can elicit emotional responses (Brooks et al., 2022; Rubaltelli et al., 2015). These emotional experiences have been identified as key motivators for individuals with a propensity for seeking thrilling sensations (Heilman et al., 2010). Additionally, it was discovered that males exhibit a greater propensity for engaging in financial risk-taking activities in comparison to females (Lerner et al., 2015). Roberti (2004) concludes that this trait pertains to the behavioural manifestations commonly referred to as risky, including engagement in high-risk sports, gambling activities, substance consumption, alcohol consumption, and preferences for adventurous holiday activities. Therefore, individuals possessing such a characteristic demonstrate a tendency to engage in high-risk financial investments (Kannadhasan et al., 2016). The results of empirical studies have provided evidence that individuals who possess sensation seeking traits tend to

display a greater degree of risk tolerance when compared to individuals who do not possess such traits (Morse, 1998; Sjöberg et al., 2009). The examination of financial risk behaviour can be readily conducted within the framework of this characteristic (Grable et al., 2004; Naqvi et al., 2020). However, there is a paucity of research that has empirically examined the correlation between SS and FRT. The above-mentioned discussion results in the formulation of the following hypotheses:

H1: Biopsychosocial indicators are positively correlated with financial risk tolerance.

H1a: Personality type is positively correlated with financial risk tolerance.

H1b: Self-esteem is positively correlated with financial risk tolerance.

H1c: Sensation seeking is positively correlated with financial risk tolerance.

2.2. Financial Literacy as a Mediator Between Biopsychosocial Indicators and FRT

Financial literacy encompasses the ability to make well-informed judgments regarding the use and management of financial resources (Bongomin et al., 2017; Tamimi et al., 2009). FL refers to the knowledge individuals need to make significant financial decisions that align with their best interests (Ahmed et al., 2021; Awais et al., 2016). The foundation of FL lies in the development of anticipations pertaining to various factors, including investment and savings. These expectations are supported by various indicators from the biopsychosocial framework (Naqvi et al., 2020). The lack of financial literacy has resulted in individuals refraining from engaging in investment activities (Oppong et al., 2023). Lusardi et al. (2008) suggest that an increase in FL is positively correlated with an increased likelihood of individuals engaging in stock market participation. The present study aims to examine the mediating effect of FL on the relationship between BPS indicators and FRT. Individuals with different personality types exhibit distinct attitudes towards FL (Thanki et al., 2019). Individuals classified as type A exhibit characteristics such as competitiveness, diligence, and self-assurance, which consequently drive them to maintain a heightened awareness of various facets pertaining to the field of investment (Zsoter, 2017). Given that investors are required to navigate various economic factors, such as investment, saving, and interest rates, it is crucial for them to have a deeper comprehension of these concepts in order to enhance their performance (Naqvi et al., 2020).

Kahneman et al. (2013) found that individuals classified as type A tend to exhibit higher FL. In contrast, individuals classified as type B exhibit greater inclination towards relaxation and tranquilly, thereby displaying a diminished concern for acquiring knowledge pertaining to economic concepts (Kannadhasan et al., 2016). Consequently, their level of financial knowledge is comparatively lower. It can be extrapolated that a higher level of FL is related to greater risk-

taking propensity (Killins, 2017). Individuals with a propensity for sensation seeking consistently exhibit a proclivity for seeking novel and distinctive ways. Consequently, they tend to possess a greater depth of understanding regarding contemporary economic concepts, thereby resulting in an elevated level of risk tolerance (Hussain et al., 2023). Given their understanding of these concepts, individuals adjust their expectations accordingly, resulting in a positive correlation between FL and FRT (Sachdeva et al., 2023; Stanovich, 2016). Individuals with a high level of self-esteem possess a strong belief in their own capabilities, enabling them to easily grasp and apply various components of macroeconomics with minimal exertion (Kannadhasan et al., 2016). Consequently, they are able to effectively align their actions and behaviours in accordance with the principles and dynamics of the macroeconomic system. As a result of their self-assurance and elevated level of FL, individuals develop a capacity for resilience in the face of financial risks (Lusardi et al., 2020). There exists a notable relationship between financial education and monetary accumulations, as individuals who possess knowledge regarding the utilization of stock premiums on equity investments are better equipped to capitalize on such opportunities (Reddy et al., 2017). There is a positive relationship between FL and the planning of retired income behaviour, as indicated by Lusardi et al. (2008). Empirical research findings suggest that individuals who demonstrate a higher degree of confidence in their financial literacy are more inclined to actively participate in financial planning activities (Lontchi et al., 2022; Witteloostuijn et al., 2008). Based on the evidence presented, it is possible to draw the following hypotheses:

H2: Financial literacy significantly mediates the relationship between bio-psychosocial indicators and financial risk tolerance.

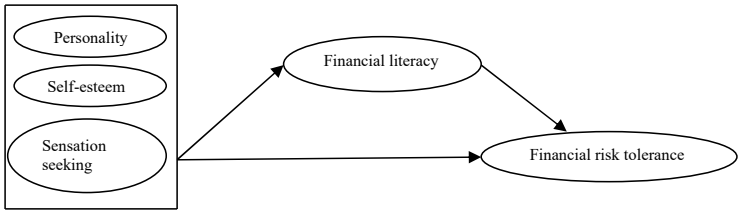
H2a: Financial literacy significantly mediates the relationship between personality type and financial risk tolerance.

H2b: Financial literacy significantly mediates the relationship between self-esteem and financial risk tolerance.

H2c: Financial literacy significantly mediates the relationship between sensation seeking and financial risk tolerance.

Research Model

The research model in this article has been developed by drawing upon existing literature, as depicted in *Figure 1*. The study investigated the proposed relationships through the utilization of covariance-based structured equation modelling (SEM).



Source: authors' compilation

Figure 1. *Proposed model*

3. Methodology

3.1. Sampling and Data Collection

The present research used a cross-sectional survey design to investigate the relationship between biopsychosocial factors and individuals' propensity to take financial risks. The primary data for this study were collected through a structured questionnaire. Convenience sampling followed by snowball sampling technique was utilized to collect the data from 690 individual investors, who have an accumulated trading experience ranging from 1 to 10 years. The snowball sampling method was also used by asking respondents to identify further respondents who possess the desired characteristics of the target population. Firstly, in the case of investors working in government organizations, a few departments were randomly selected for the collection of data – e.g. The Department of Health and Medical Education, The Department of Higher Education, etc. In the case of private organizations, we collected data from Policy Bazaar, Sher Khan Securities Limited, Bajaj Alliance, Jkb Financial Services Limited, Hdfc Bank, and Axis Bank. The investors' group present on a social media platform (Indian traders' and investors' club, Indian retail investors, mutual fund investors group of India, private investors' group) also served as a potential database for data collection. Similarly, purposive sampling was done in the case of businessmen and professionals.

Hair et al's (2010) criterion was used for determining the sample size of the study, which suggests that there should be 10 respondents for every single item. The Kaiser–Meyer–Olkin (2017) test was used to check for sample adequacy. The value of the test was 0. 862, suggesting the sample adequacy for the study (Field, 2009). A pilot study of 185 investors and the discussion with financial experts was done before conducting the final survey. Out of the 690 responses, only 586 were considered valid for the statistical analysis because of the apparent inconsistencies or missing values in the different sections of the questionnaire. The study targeted various age groups, occupations, trading experiences, marital statuses, genders, and educational qualifications. Gender distribution revealed the dominance of male

respondents: 76% males and 24% females. Almost 398 investors were single, and the rest were married. The majority of the respondents had completed at least the bachelor's level education. The respondents had an average trading experience of 4 years and a mean age of 36, as represented in *Table 1*.

Table 1. *Respondents' demographic profile*

Characteristics	Frequency	Percentage
Age		
20–30	125	21.3
31–40	358	61.1
41–50	68	10.2
51 and above	35	5.9
Gender		
Male	398	67.9
Female	188	32.1
Marital status		
Married	215	36.7
Unmarried	371	63.3
Monthly income (Rs)		
Below 25,000	56	9.1
25,000–50,000	301	51.4
50,000–75,000	118	20.1
75,000–100,000	84	14.3
Above 100,000	27	4.6
Occupation		
Student	58	9.9
Government employee	205	34.9
Private employee	218	37.2
Educational background		
Up to higher secondary level	95	16.2
Graduate	316	53.9
Post-graduate	77	13.1
PhD or above	56	9.5
Professional	43	7.3

The respondents of the study were required to fill in the multiple sub-sections of demographics, financial literacy, biopsychosocial indicators, and financial risk tolerance. The study consisted of three independent variables, namely personality type, self-esteem, and sensation seeking, and one dependent variable, namely financial risk tolerance, with the mediating variable of financial literacy. In order to measure the self-esteem, which is a dependent variable, the authors used a 10-item scale developed by Rosenberg (1965). The 4-point scale ranged

from 1 (= strongly agree) to 4 (= strongly disagree), e.g. "I think I have a number of good qualities."; "I feel I do not have much to be proud of."; etc. High scores represented positive self-esteem, whereas low scores represented negative self-esteem. Personality type was measured with the help of a 6-item scale developed by Grable et al. (2004). The 4-point scale ranged from 1 (= not at all) to 4 (= very well). The scale contained items such as "usually feeling pressed for time", "eating too quickly", "upset when have to wait for anything", etc. High scores represented personality type A, whereas low scores represented personality type B. A 5-item scale developed by Grable et al. (2004) was employed for measuring the sensation seeking indicator. Some of the items used in the scale are: "It is fun and exciting to perform or speak before a group."; "I would like to travel to places that are strange and far away.", etc. The 4-point scale ranged from "not at all" to "very well". For measuring financial literacy, we adopted a 7-item scale developed by Cude et al. (2006). Some of the items included in the scale are: "I can prepare my own weekly (monthly) budget."; "I can understand financial affairs and keep records."; etc. Lower values on the scale indicated respondents possessing a low level of financial literacy, and higher values indicated individuals possessing a high level of financial literacy. For measuring the financial risk tolerance of an individual investor, a 5-item scale developed by Grable et al. (2004) has been employed. The scale collected the responses on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree", e.g. "When I think of the word 'risk', the term 'loss' comes to mind immediately."; "I am more comfortable putting my money in a bank account than in the stock market."; etc. The previous literature review highlights that financial literacy as a mediating variable is underexplored in the context of investment decision making. Therefore, this study makes an attempt to look into its mediating effect with respect to investors' financial risk tolerance.

4. Data Analysis and Results

To examine the hypothesis of the research, the statistical software SPSS and the technique of structural equation modelling (SEM) were employed. Additionally, the software AMOS was used to assess the direct and indirect impact of the independent variables on the dependent variable. The decision to accept or reject a hypothesis is contingent upon the statistical significance of the obtained results. According to Nusair et al. (2010), in management research, the most appropriate and empirically supported method for examining the intricate behavioural cause-and-effect relationships is SEM. Hearman's single-factor test was employed to ascertain the presence of common method bias in the study. The test yielded a total variance of 38.92%, which falls below the threshold value of 50%.

4.1. Measurement Model

The statistical methodologies proposed by Fornell et al. (1981) were employed to ascertain the validity and reliability of the constructs under investigation. The reliability analysis of the variables was done with the use of Composite Reliability (CR) and Cronbach's alpha. All the constructs of the model had a composite reliability and Cronbach's alpha above the cut-off value of 0.7 (F. Ali et al., 2018), as shown in *Table 2*. Therefore, all scales are reliable. Similarly, the convergent validity of the study variables was established using the master validity tool by Gaskin and Linn (2016). Average Variance Extracted (AVE) was used for checking the internal consistency and multicollinearity of the data. Similarly, all constructs had convergent validity above the threshold value of 0.5 (Fornell et al., 1981), as shown in *Table 2*. The Heterotrait-Monotrait (HTMT) ratio was used to check the discriminant validity. Henseler et al. (2015) suggested that all values should be lower than 0.9. Test results are shown in *Table 3*. Further, as part of the measurement model, factor loading for each indicator item was ascertained. As shown in *Table 2*, all values were greater than the 0.7 threshold value (Gefen et al., 2005). The overall goodness of fit of the models was measured using model fit indices (CMIN/df, CFI, TLI, RMSEA, and GFI). The hypothesised 5-factor CFA model fits the sample data extremely well, and all values were within their respective permissible ranges.

Table 2. *Measurement model*

Constructs	Items	Factor loading	Alpha	CRE	AVE
Personality type	AB1	.821	.927	.827	.602
	AB2	.728			
	AB3	.701			
	AB4	.812			
	AB5	.810			
	AB6	.948			
Self-esteem	SE1	.726	.911	.926	.638
	SE2	.903			
	SE3	.798			
	SE4	.840			
	SE5	.885			
	SE6	.913			
	SE7	.793			
	SE8	.729			
	SE9	.907			
	SE10	.858			

Constructs	Items	Factor loading	Alpha	CRE	AVE
Sensation seeking	SS1	.822	.869	.904	.758
	SS2	.843			
	SS3	.801			
	SS4	.724			
	SS5	.705			
Financial literacy	FL1	.839	.825	.903	.616
	FL2	.825			
	FL3	.714			
	FL4	.804			
	FL5	.759			
	FL6	.821			
	FL7	.707			
Financial risk tolerance	FRT1	.822	0.826	0.818	0.721
	FRT2	.764		.	
	FRT3	.860			
	FRT4	.879			
	FRT5	.756			

Table 3. *Discriminant validity (HTMT ratio)*

	PT	SE	SS	FL	FRT
Personality type (PT)					
Self-esteem (SE)	0.264				
Sensation seeking (SS)	0.328	0.269			
Financial literacy (FL)	0.390	0.412	0.218		
Financial risk tolerance (FRT)	0.250	0.398	0.307	0.424	

Table 4. *Model fit indices*

Fit Indices	RMSEA	GFI	SRMR	TLI	CFI	CMIN/df
Values	0.054	.923	.043	.910	.982	2.69

4.2. Structural Model

The hypothesis-testing procedure employed in this study involved an evaluation of the correlation and significance of the associations between the independent variables and the dependent variable. To accomplish this, structural equation modelling (SEM) was utilized, specifically the Amos software package. The findings presented in *Table 5* illustrate that the biopsychosocial indicators, namely personality type ($b = 0.327$, $p < 0.01$), self-esteem ($b = 0.283$, $p < 0.01$), and

sensation seeking (b = 0.398, p < 0.01), had a significant impact on individuals' financial risk tolerance prior to conducting the mediation analysis. The findings of the study indicate a statistically significant positive correlation between personality type and FRT, thereby supporting the acceptance of hypothesis H1a. The findings of this study also indicate a positive and statistically significant correlation between self-esteem and FRT, thereby providing support for the acceptance of hypothesis H1b. The positive and significant relationship between self-esteem and FRT leads to the acceptance of H1b. Similarly, it was found that sensation seeking had a positive and significant correlation with FRT, thereby resulting in the acceptance of H1c. The overall results lead to the acceptance of H1, which suggests that BPS indicators are positively correlated with the FRT of an individual investor.

Table 5. *Direct effect before mediation analysis*

Hypothesis	Parameters	Direct effect before mediation (b)	P-value
H1a	PT-->FRT	0.163	***
H1b	SE-->FRT	0.198	**
H1c	SS-->FRT	0.398	***

The next step is to evaluate the mediating role of financial literacy after analysing the direct correlations between the study variables. Consequently, the present study investigated the individual impact of BPS indicators under study on FRT. The findings revealed that, with the exception of sensation seeking (b = 0. 018, p > 0. 05), all other indicators, namely personality type (b = 0.238, p < 0.01) and self-esteem (b = 0.159, p < 0.01), exhibited statistically significant effects on financial literacy, as depicted in *Table 6*. In the same way, it is worth noting that financial literacy also significantly impacted investors' financial risk tolerance (β = 0.196, p < 0.05). Following an evaluation of the direct effect, the bootstrapping procedure was employed to examine the indirect effects of the mediation analysis. The process of bias-corrected bootstrapping was conducted in AMOS 22, involving 5,000 resamples and a confidence interval of 95%. This analysis aimed to investigate the indirect effects on FRT. The findings from the test, as presented in *Table 6*, suggest that financial literacy plays a mediating role in the relationship between personality type, self-esteem, and FRT. Therefore, hypotheses H2a and H2b were deemed valid and supported by the evidence. Nevertheless, the analysis did not reveal any mediation effects of financial literacy in relation to the association between sensation seeking and FRT, resulting in the rejection of hypothesis H2c.

Table 6. *Direct and indirect effect after mediation analysis*

Relationship	Direct effect	Indirect effect	Confidence interval		P-value	Conclusion
			LOWER BOUND	UPPER BOUND		
PT-->FL-->FRT (H2a)	0.378***	0.074	0.168	0.356	0.008**	Partial mediation
SE-->FL-->FRT (H2b)	0.298**	0.058	0.172	0.383	0.004***	Partial mediation
SS-->FL-->FRT (H2c)	0.301***	0.059	-0.008	0.027	0.68^{ns}	No mediation

4.3. Correlation Analysis

Table 7 shows matrices indicating the correlations between constructs, means, and standard deviations (SD). The findings indicate that a significant correlation exists between the majority of the constructs examined in the study. The analysis of the correlation matrix indicated that all correlation coefficients were below 0.9, providing evidence that there was no multicollinearity present among the studied constructs.

Table 7. *Inter-item correlation matrix*

	PT	SE	SS	FL	FRT	Mean	SD
PT	1					3.286	0.731
SE	0.46***	1				3.184	0.623
SS	-0.28***	-0.17*	1			3.028	0.821
FL	0.42**	0.32***	-0.28**	1		2.988	0.796
FRT	0.38***	0.48***	0.39***	0.43***	1	3.028	0.825

5. Discussions and Findings

The primary objective of this study was to examine the relationship between the biopsychosocial indicators, financial literacy, and financial risk tolerance among individual investors within the Indian context. In the developing market economy, the active participation of individual investors has an immense significance, especially given the presence of a highly heterogeneous retail investor base within the country. The analysis revealed that all BPS were positively and significantly associated with FRT before the introduction of the mediation test. Therefore, the findings of the present study align with the prior findings of Baumeister et al. (2003), Grable et al. (2004), Kannadhasan et al. (2016), and Naqvi et al. (2020). With respect to the first hypothesis of the study, the findings posit that personality type has a substantial influence on FRT and is supported by the data collected from retail investors in India. The obtained results are consistent with the findings reported

in prior research (Carducci et al., 1998; Hallahan et al., 2004; Kannadhasan et al., 2016; Naqvi et al., 2020; Wong et al., 2016). However, these findings contradict the findings reported by Grable. The findings of our study are further corroborated by the prospect theory, which explains how type A and type B personalities might perceive and approach risk differently. A possible explanation is that individuals exhibiting type A characteristics, such as competitiveness, ambition, and a sense of urgency, exhibit a higher propensity to participate in financial ventures that involve greater levels of risk (Thanki et al., 2019). Within the context of financial risk tolerance, individuals classified as type A exhibit behavioural tendencies that are congruent with a greater inclination to participate in risk-taking activities (Dinç Aydemir et al., 2017; Wong et al., 2016). Individuals' propensity for competition and aspiration for achievement renders them more prone to actively pursue investment prospects that offer higher returns (Harlow et al., 1990). Furthermore, individuals' lack of patience and heightened sense of urgency may result in a preference for obtaining immediate gains rather than long-term stable and secure investments (Houston et al., 1988). Conversely, individuals classified as type B exhibit a demeanour that is more inclined towards relaxation and a laid-back approach. Individuals of this group exhibit a tendency towards patience, a lower inclination towards competition, and a greater level of satisfaction with the existing state of affairs (Zuckerman et al., 2000). The propensity for individuals to exhibit a preference for lower-risk financial decisions can be ascribed to their prioritization of stability and a sense of security over potential gains (Thanki et al., 2014).

Further, the findings revealed that self-esteem significantly influences the FRT of individual investors. Our results are consistent with several prior findings (Chatterjee et al., 2009; Grable et al., 2004; Kannadhasan et al., 2016; Naqvi et al., 2020; Rosenberg, 1965; Zuckerman et al., 2000). The self-verification theory provides a robust framework for comprehending the association between self-esteem and financial risk tolerance. Individuals with a high level of self-esteem typically have a more favourable self-concept, leading to enhanced trust in their capabilities and decision-making (Josephs et al., 1992). This confidence can extend to their financial decisions, making them more at ease with taking financial risks. They are more likely to believe they can handle prospective losses and have confidence in their ability to make profitable investment decisions (Chatterjee et al., 2009). On the contrary, investors with a reduced level of self-esteem might display a greater aversion to risk. They may perceive themselves as less competent in financial matters and be fearful of making mistakes (Kannadhasan et al., 2016). Therefore, they may prefer secure, low-risk investments to avoid the possibility of failure and safeguard their fragile self-concept. The subsequent hypothesis of the study was "Sensation seeking is positively correlated with financial risk tolerance." The results of our study are supported by previous findings (Grable et al., 2004; Kuzniak et al., 2017; Rabbani et al., 2020; Roberti, 2004), and they suggest that

sensation seeking has a significant influence on the FRT of individual investors. The plausible explanation is that individuals having inclination towards sensation seeking exhibit a tendency to actively pursue and engage in activities that provide a heightened state of stimulation and exhilaration (Zuckerman, 1994). Within the realm of financial decision-making, individuals who exhibit sensation-seeking tendencies may demonstrate an ability to tolerate financial risk. Individuals are inclined to participate in activities that involve risk-taking as they seek potentially advantageous experiences. The willingness to engage in risk-taking activities can be observed in different domains of personal finance, including investment activities, entrepreneurial endeavours, and discretionary spending. Individuals who exhibit elevated levels of sensation-seeking tendencies frequently demonstrate a preference for investment opportunities that offer the possibility of substantial returns (Naqvi et al., 2020). For instance, individuals may exhibit a preference for investing in high-volatility stocks, speculative assets, or ventures within emerging markets. The allure of unpredictability and the potential for significant rewards act as compelling incentives for individuals with a propensity for seeking thrilling experiences (Rabbani et al., 2020).

Further, the results of this study revealed the significant influence of financial literacy on the personality type and self-esteem where no mediation was found with respect to sensation seeking. This is one of the pioneer studies where the mediating effect of FL was ascertained on the relationship between BPS and FRT. Individuals with higher self-esteem may display greater motivation and confidence in their abilities, which can extend to their willingness to acquire financial knowledge (Ali et al., 2021). The attainment of financial literacy empowers individuals to effectively evaluate risk and assess potential financial decisions with precision (Hassan Al-Tamimi et al., 2009). Those with higher financial literacy are more capable of understanding the trade-offs between risk and reward, as well as the consequences of their actions. The more financial knowledge people gain and the more they understand financial concepts, the more informed and rational decisions they will make about risks (Tang et al., 2016). This implies that investors possessing a higher level of FL are more inclined to adopt a cautious and deliberate approach when engaging in financial risk-taking activities (Ansari et al., 2022). Conversely, individuals possessing lower levels of FL may exhibit a greater susceptibility to emotional and cognitive biases, resulting in more impulsive and less meticulous decision-making regarding risks. Higher self-esteem leads to higher FL, which, in turn, contributes to a more informed and rational approach to financial risk (Sekścińska et al., 2021). When considering the mediating role of financial literacy, we find that the relationship between personality type and financial risk tolerance is partially explained by individuals' differing levels of financial knowledge (Kannadhasan et al., 2016). Personality type A indirectly influences FRT through financial literacy, leading to a more informed and rational

approach to financial risk. On the other hand, personality type B individuals may have lower financial literacy levels, potentially contributing to a more cautious and risk-averse financial decision-making process (Thanki et al., 2020). Therefore, the results of our study lead to the acceptance of the hypothesis that FL significantly mediates the relationship between personality type and FRT. H2c is rejected because our results reveal that financial literacy plays an insignificant role in the relationship between sensation seeking and FRT (Worthy et al., 2010). The study indicates that financial literacy does not significantly mediate the relationship between sensation seeking and financial risk tolerance. The findings suggest that individuals with higher levels of sensation seeking are more willing to take financial risks regardless of their financial knowledge and understanding. While financial literacy remains important for making informed financial decisions, it appears to have a limited impact on how sensation seekers approach and perceive financial risks (Naqvi et al., 2020).

The inaccurate assessment of the FRT can potentially result in opting for inappropriate investment alternatives. Consequently, this may lead to the dwindling of investors' financial resources and a reduced overall well-being. Financial service providers may face negative consequences when clients make poor investment decisions such as selling a profitable investment or investing in an inappropriate portfolio. The consequences of such actions include a negative impact on their credibility and reputation, leading to a decline in customer base, among other potential outcomes. This study is expected to yield a substantial scholarly contribution by expanding the scope of discussion and analysis in the fields of FRT and FL. The theory pertaining to financial decision making and FRT is expected to be reinforced. The present study's practical implications will be of value to retail investors, as they provide insights into the association between their personality traits, self-esteem, sensation seeking, and their financial literacy and financial risk tolerance. While formulating macroeconomic and investment policies, policymakers in India and other nations can also benefit significantly from the recommendations of the current study.

In addition to the noteworthy contributions made by this research, it is imperative for future researchers to take into account several limitations associated with this study. The present study examined only three biopsychosocial indicators, neglecting the inclusion of demographic and environmental factors. In order to enhance the scope of research, future researchers may also take into consideration these factors. Moreover, the present study was carried out within the specific context of India. Lastly, it is suggested that future researchers should be encouraged to conduct cross-national studies to create a multidimensional model to comprehend the impact of biopsychosocial indicators in the context of FRT and investment decision making.

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