What explains the investment decision-making behaviour? The role of financial literacy and financial risk tolerance

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Abstract: Investment decision-making behaviour has a significant role in the financial growth of individual investors. This study investigates the impact of financial literacy on investment decision-making behaviour by taking mediating role of financial risk tolerance. The study employed quantitative research design and multi-stage random and convenience sampling. A survey questionnaire was used to collect data from 384 registered individual investors of Pakistan Stock Exchange (PSX). Structural equation modelling (SEM) was used to test the relationships between the constructs. Results showed positive and significant impact of financial literacy on investment decision-making behaviour and financial risk tolerance among individual equity investors. Similarly, financial risk tolerance mediated the relationship between financial literacy and investment decision-making behaviour. The study suggests measures to policy makers for improving financial literacy among individual investors. It also proposes significant functional insights for stockbrokers, investment advisors, and financial managers through examining the investment decision-making behaviour of individual equity investors. This study serves as a guideline for academia to further develop/improve the financial literacy of future investors.

Keywords: behavioural finance; financial literacy; financial risk tolerance; FRT; investment decision-making.

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1 Introduction

Decision-making is a complex process that occupies a pivotal place in the field of behavioural finance. Investor behaviour is based on various factors other than market volatility and opportunities for profit maximisation (Kim and Nofsinger, 2008; Puaschunder, 2017). Financial literacy (FL) is one of the most important factors that has been traced back in history to gauge investment decision-making process (Becchetti et al., 2013; Lusardi and Tufano, 2015). Recent studies reinforce the significance of FL

(Ahmed et al., 2017; Clark et al., 2017; Gupta and Gupta, 2018). Besides awareness, it provides an understanding of investments which give rise to a investor's confidence and hence more participation (Becchetti et al., 2013; van Rooij et al., 2007, 2011). Various studies heightened the importance of FL for making informed investment decisions (Clark et al., 2017; Gupta and Gupta, 2018; Lusardi and Mitchell, 2014; Van Rooij et al., 2012). Past research argues that low financially literate individuals are averse to market participation (Van Rooij et al., 2011), pay high interests/debt fees (Lusardi and Tufano, 2009) and utilise high-cost techniques for borrowing (Lusardi and Scheresberg, 2013).

Mostly, researchers have examined basic concepts of FL which might have understated its influence on investment decisions (Allgood and Walstad, 2016; de Goeij et al., 2018; Yew et al., 2017). Allgood and Walstad (2016) explored perceived and actual FL that remained overlooked in most of the literature. Allgood and Walstad (2016) argued that actual and perceived FL determine the true level of financial knowledge and its real impact on investors' decision-making. Actual FL develops financial skills, whereas perceived FL improves confidence for making investment decisions (Allgood and Walstad, 2016; Clark et al., 2017; Lusardi and Mitchell, 2011, 2014).

Most of the studies on FL were carried out in developed markets and the researchers emphasised only on basic financial knowledge (Brunton, 2006, 2009; Christelis et al., 2010; Hilgert et al., 2003; Lusardi and Mitchell, 2011; Moore, 2003). However, a few researchers have focused on awareness of basic financial concepts in developing markets (Ahmed et al., 2017; Al-Tamimi and Kalli, 2009; Chu et al., 2016; Ghaffar and Sharif, 2016; Gupta and Gupta, 2018; Jariwala, 2015). A thorough review of literature reveals that level of FL in developed countries is sufficient but still lower than the needed level, whereas developing countries are far behind the required level. Moreover, research has not emphasised on perceived and advanced concepts of FL (Allgood and Walstad, 2016).

Financial risk tolerance (FRT) is another important factor that has an important role in investment decision-making behaviour (IDMB) (Sitkin and Pablo, 1992; Van de Venter et al., 2012). However, only a few studies have identified the relationship of FL with FRT and IDMB (Cardak and Wilkins, 2009; Hariharan et al., 2000). Moreover, FL has not received adequate attention in terms of FRT, therefore it is very crucial to investigate that how FL influences FRT and investment decision-making of investors (Beal and Delpachitra, 2003; de Goeij et al., 2018; Gustafsson and Omark, 2015; Huzdik et al., 2014; Larson et al., 2016; Sjoberg and Engelberg, 2009).

Pakistan Stock Exchange (PSX) is one of the developing markets and a key driving force for economic growth in the country. The PSX is facing many issues including high volatility (Amjad, 2010; Najaf and Ashraf, 2016), poor financial knowledge (Ghaffar and Sharif, 2016), a massive heterogeneity among investors behaviour (Bashir et al., 2013; Shafi, 2014) and a high-risk factor which is greater than the neighbouring markets (Amjad, 2010; Najaf and Ashraf, 2016). These issues have massively influenced the investors, hence they are reluctant to invest in PSX (Ali et al., 2013, 2010; Awais et al., 2016). Among all, the FL is recognised as a serious issue for stock investors in Pakistan because the policymakers are unable to pay proper attention to this issue (Bhabha et al., 2014). The individual investors have insufficient financial knowledge; therefore, institutional investors are dominating and holding the major portion of stocks (Ghaffar and Sharif, 2016). Moreover, as per global FL ranking survey, Pakistan is ranked 108th with literacy score of 26, which is far behind the required level of FL. This also verifies that FL is one of the key issues for Pakistani investors in investment decision-making. In

addition, due to a greater risk factor, investors are more interested to invest in fixed deposits than stocks (Bashir et al., 2013). Thus, the literature shows evidence that the stated issues have massively influenced the investors and they are reluctant to invest in PSX (Ali et al., 2013, 2010; Awais et al., 2016).

Pakistan stands out as one of the frontier economies with young and relatively undeveloped financial markets with low equity market capitalisation (ACCA, 2012). For instance, the total number of registered individual investors in PSX is only about 0.23 million, which indicates that PSX remained unsuccessful to attract a major portion of investors base (NCCPL, 2018; PSX, 2018). Frontier economies are characterised by illiquidity and resultant pricing inefficiencies mean that profitable opportunities often surface for frontier-market investors. In addition to this, frontier markets have a tendency to achieve higher economic growth rates on average with respect to their developed and emerging counterparts. Thus, such economies have potential to accommodate significant development given the set of opportunities which they offer for investors. As per the survey conducted by 2018 A.T. Kearney Foreign Direct Investment (FDI) Confidence Index, 39% of the investors are willing to enhance their investments in frontier markets, in comparison to 44% in emerging markets and 40% in developed markets. The investment decisions in frontier markets are also easier and more accessible in recent years, particularly through the formation of more exchange-traded funds (ETFs) with exposure to such markets. In view of these evidences, it is important to study FL in Pakistan with the frontier economy perspective. Moreover, it will be very meaningful for the policy makers to devise new policies to build the investors' confidence (Banker, 2019).

A review of the extant literature revealed that investigation of perceived and actual (basic and advanced) FL remained unexplored which understated its impact on investor behaviour. Similarly, the role of FRT between FL and investment decisions needs in-depth empirical investigation. Therefore, to serve the gap, the present study explores the impact of FL on investment decision-making behaviour and FRT. In addition, it examines how FRT mediates the relationship between FL and investment decision-making behaviour.

This paper consists of six sections. Section 2 deals with literature review, Section 3 includes methodology of the paper and Section 4 represents results, analysis and discussions. Similarly, Section 5 incorporates conclusion and implications and Section 6 states the future research.

2 Literature review

IDMB of investors has been largely discussed by the behavioural science researchers since last few decades (Hershey and Walsh, 2001; Mouna and Anis, 2017). FL is one of the major factors that affect investment decisions of investors (Allgood and Walstad, 2016; Lusardi and Mitchell, 2014). It has gained huge significance over the decades due to the development of financial markets through globalisation and complex financial environment (Ahmed et al., 2017; Murendo and Mutsonziwa, 2017; Potrich et al., 2015). It has also been investigated that financially literate individuals are highly risk tolerant and more willing to invest in risky assets (Nguyen et al., 2016).

2.1 Investment decision-making behaviour

Investment decision-making is a process of choosing a particular alternative from a number of alternatives. It is also an activity that follows after proper evaluation of all the alternatives (Jariwala, 2015). Researchers observed different incompetent financial decisions taken by the investors, e.g., holding of winning stock for a shorter period and losing stocks for a longer period (Odean, 1998), excessive trading without sufficient analysis (Odean, 1999) and improper risk diversification (Goetzmann and Kumar, 2008). Studies argued that financial knowledge has a significant impact on quality of investment decision-making behaviour of investors (Hershey and Walsh, 2001; Mouna and Anis, 2017). However, in the presence of huge amount of financial knowledge and number of choices, it is more difficult to make sound and correct investment decisions (Kozup et al., 2008).

In the same manner, prior studies revealed that investors are facing problems in investment decision-making because of asymmetric information. The asymmetric information is uneven and unequal information that limits investor's decision making and decisions can also be biased (Díaz, 2009; Rapp and Aubert, 2011). Moreover, attainment of financial knowledge and best financial practices are the actual way to make correct and unbiased financial decisions (Glaser and Weber, 2009; Grinblatt and Keloharju, 2009; Hong et al., 2004). Also, individual investors mostly depend upon their prior investment experience for making decisions.

Furthermore, Clark and Soutar (2004) discussed that investors' investment decisions depend upon the position of listed companies in the market and trends in stock prices variation. Investors decrease their selling decisions when stocks prices are low compared with the initial buying price, which is called 'disposition effect' (Odean, 1998; Shefrin and Statman, 1985). Similarly, individual investors prefer to buy the stocks which they traded in the past rather than the stocks they never traded, as they have prior knowledge and experience of such stocks.

Investors' investment behaviour is significantly influenced by environmental factors such as economic and political stability, law and order situation and cultural issues, which have substantial impact on the selection of risky portfolios, effective usage of capital, strategic investment decisions and decision-making behaviour of investors (Carpentier and Suret, 2015; Elmassri et al., 2016; Günster and van Dijk, 2016).

Market sentiments, bearish and bullish sentiment have huge impact on investors' decision-making behaviour (Barberis et al., 1998; Daniel et al., 1998; Hong and Stein, 1999). According to Jagongo and Mutswenje (2014), investment decisions of investment managers are also based on judgmental approach, fundamental analysis, and technical analysis. Fundamental analysis is based on macroeconomic and firm-specific factors and is used for long-term investments whereas technical analysis is being exercised for short-term investments (Lui and Mole, 1998; Wong and Cheung, 1999).

In case of Pakistan, several studies found that individual investors are observed to be highly risk-averse and nervous in making investment decisions because of insufficient financial knowledge and information asymmetry (Awais et al., 2016; Lodhi, 2014; Najaf and Ashraf, 2016; Yasir, 2015). Studies also revealed that decision-making behaviour of investors is also under the great influence of behavioural factors such as herding effects in Pakistan stock market (Ali et al., 2016; Farooq and Sajid, 2015; Ishfaq and Anjum, 2015; Khan, 2014; Mahmood et al., 2016; Najaf and Ashraf, 2016; Qureshi and Hunjra, 2012; Shafi, 2014; Yasir, 2015).

2.2 Financial literacy

FL is crucial for investors because of globalisation and complex financial environment (Murendo and Mutsonziwa, 2017; Potrich et al., 2015). It is a skill of financial concepts, e.g., compound interest, time value of money, risk diversification, financial planning, debt management and saving techniques (Lusardi, 2012; Lusardi and Tufano, 2015; Van Rooij et al., 2011; Yew et al., 2017). Several other investigators have also reported various FL concepts such as a specific knowledge of financial products, capability of minimising financial mistakes, effective wealth management, capacity to anticipate financial issues, ability of saving extra money, capability of making educated and informed judgments, ability of effective financial planning, effective application of financial knowledge for investment decisions-making and a combination of self-assessed and actual financial knowledge (Atkinson et al., 2006; Gouws and Shuttleworth, 2009; Hogarth, 2002; Schagen and Lines, 1996; Siegenthaler et al., 2000).

FL improves the ability of making informed decisions to achieve financial objectives (Ahmed et al., 2017; Clark et al., 2017; de Goeij et al., 2018; Gupta and Gupta, 2018; Worthington, 2006; Xue et al., 2018). Researchers have firm belief that in forthcoming scenarios individuals must be self-sufficient in FL to deal with complex financial instruments (Allgood and Walstad, 2016; Lusardi and Mitchell, 2014) and to make worthy financial decisions (Calcagno and Monticone, 2015). It also has a significant positive relationship with individual investors' decisions (Al-Tamimi and Kalli, 2009; Lodhi, 2014), a strong predictor for making informed investment decisions (Hershey and Walsh, 2001; Kozup et al., 2008), debt decisions and investor behaviour (Allgood and Walstad, 2016; Lusardi and Tufano, 2015).

Financial Services Authority (FSA) conducted a survey in the UK to assess FL of investors. They found that almost 70% of the respondents have poor FL which is influencing their financial decision-making. Lusardi and Mitchelli (2007) reviewed the level of FL in Europe, Japan, and Australia and revealed that low numeracy is prevailing in majority of the European and Australian respondents. These results are consistent with the study carried out by Christelis et al. (2010) in European countries. Mostly, researchers have investigated basic financial knowledge among the investors and its impact on financial actions. Jariwala (2015) investigated FL in India and found that overall FL in Gujarat (India) is very poor. Chu et al. (2016) also examined a data from the '2014 Chinese Survey of Consumer Finance and FL' and found that households contained higher financial knowledge and have great tendency to invest in mutual funds.

In view of Pakistan, Ahmed et al. (2017) investigated that FL is a competitive advantage for individual investors. Bhabha et al. (2014) also measured basic financial awareness in Pakistani female working class and concluded that due to low level of FL they invest in fixed deposits, gold or real estate. However, few working women can manage their own savings and make investment decisions independently. Lodhi (2014) and Ghaffar and Sharif (2016) found similar patterns of investors' financial knowledge and financial awareness in Karachi. Some researches in Pakistan concluded that investors are highly risk averse and nervous to invest in equity markets because of a very low level of financial knowledge and confidence of equity investors (Awais et al., 2016; Lodhi, 2014; Najaf and Ashraf, 2016; Yasir, 2015).

Allgood and Walstad (2016) investigated FL in a comprehensive way by using two dimensions of FL, perceived and actual. Perceived FL measures self-assessed financial knowledge and actual FL (debt) measures basic and advanced concepts of finance.

Moreover, perceived FL is a self-assessment and belief of the individuals in their own financial knowledge or what they perceive about their financial knowledge (Carlson et al., 2009; Flynn and Goldsmith, 1999). Whereas, actual FL is an individual's perfect stored financial information and a degree of confidence of any individual to make sound decisions (Brucks, 1985; Selnes, 1986). Also, actual FL is what individuals actually know contrasting with perceived FL what they think they know (Alba and Hutchinson, 2000). Previously, researchers used terms such as subjective or objective for perceived or actual financial knowledge (Hung et al., 2009; Lusardi and Mitchell, 2014).

Lusardi and Mitchelli (2006), Stango and Zinman (2009) and Van Rooij et al. (2011) explored that actual FL is an individual's concept about real financial knowledge such as diversification of risk, interest compounding and inflation, time value of money and money illusion. It is also investors' level of confidence for market participation and decision-making (Carlson et al., 2009). Studies further explained that basic actual FL is similar to basic financial knowledge such as financial concepts of inflation, risk diversification and compound interest rate (Lusardi, 2012; Lusardi and Mitchell, 2011). Moreover, Agarwalla et al. (2012) stated that actual FL deals with investor's objective knowledge about inflation, risk diversification, and interest compounding. Therefore, it is crucial to investigate FL with its complete topographies such as actual FL (basic and advance) and perceived FL in respect of FRT and investment decision-making behaviour of individual equity investors in PSX. Therefore, this study measures FL as a composite variable containing its entire terminologies.

In this study we explore the hypothesis (H_1) that FL has positive and significant impact on IDMB of individual investors. Moreover, this paper will test the hypothesis (H_2) that FL has positive and significant impact on FRT of individual investors.

2.3 FRT as a mediator

FRT is widely discussed in the literature by behavioural finance researchers, however, uniformity is still lacking in interpreting the FRT (Cooper et al., 2014). One commonly accepted FRT definition offered by Grable (2000) is "the utmost level of uncertainty that individuals are agreed and willing to accept while making their financial decision." Researchers have discussed different forms of FRT including subjective risk, objective risk and perceived risk (Sitkin and Pablo, 1992; Van de Venter et al., 2012). Similarly, Cooper et al. (2014) discussed FRT in terms of attitude, propensity, knowledge, and capacity.

In relation to FRT and FL, most importantly, Awais et al. (2016) identified a significant role of FRT in the relationship between FL and investors' decision-making. Similarly, Nguyen et al. (2016) investigated the impact of FRT on decision-making of individual investors in respect of FL and financial advice and found that more financially literate investors are highly risk tolerant and more willing to invest in risky assets. The subsequent studies have found similar results (Cardak and Wilkins, 2009; Hariharan et al., 2000). Moreover, Masters (1989) identified that risk tolerance is influenced by high or low FL of investors, as higher FL is positively related to risk-taking of investors. Similarly, Sachse et al. (2012) and de Goeij et al. (2018) explained that FL has a significant impact on investment risk perception which leads to better decision-making.

Sjoberg and Engelberg (2009) and Yao et al. (2011) argued that individuals may have extremely different financial risk perceptions due to lower FL than those who have higher FL. In view of Pakistan, Awais et al. (2016) theoretically explored the mediating role of FRT between FL and investment decisions. As per authors' best knowledge, empirical investigation of FRT as mediator between FL and IDMB has not been investigated.

To bridge the gap, this paper will test the hypothesis (H_3) that FRT mediates the relationship between FL and investment decision-making behaviour of individual investors.

To conclude the literature review, the influence of FL in terms of perceived and actual (basic and advanced) has been discussed in the literature. Various studies have identified a positive relationship between FL (basic) and investment decision-making of individual investors. However, existing researchers mostly examined FL descriptively. Moreover, FL in terms of perceived and actual (basic and advanced) has not been investigated thoroughly. Therefore, to investigate the factual impact of FL on IDMB, it is compulsory to investigate both topographies empirically. In addition, past investigators explored a significant role of FRT among the determinants of investment decision-making. However, the mediating role of FRT between the FL and IDMB of individual stock investors remained untapped. Considering the existing literature, the stated issues will be investigated empirically in the next sections.

3 Data methodology

The target population for this study is registered individual investors investing in PSX. The total number of registered individual investors is 225,354 in PSX (NCCPL, 2018; PSX, 2018).

Based on Krejcie and Morgan (1970) formula and table, this study had selected a sample size of 384. A multi-stage sampling technique was used to collect the data. In the first stage, an overall random sample of 384 registered individual investors of PSX was calculated. In the second stage, by using convenience sampling 384 questionnaires were distributed among the individual investors because the list of investors was not available due to privacy and concerns of the investors. As recommended by Saunders et al. (2009, 2011), the convenience sampling can be used when a specific number of population is not available and sample is chosen from a group of people easy to contact and access.

This study has used SPSS and AMOS to analyse descriptive analysis, factor loading, reliability, correlation analysis, and model estimation to further analyse the causal relationships among independent, mediating and dependent variables. Initially, the study used SPSS to perform the data filtration, e.g., missing values and outliers' identification. Similarly, the study conducted univariate normality, multivariate analysis and exploratory factor analysis (EFA) by using SPSS. Later, AMOS was used to perform confirmatory factor analysis (CFA), model estimation and causal relationships among independent, mediating and dependent variables.

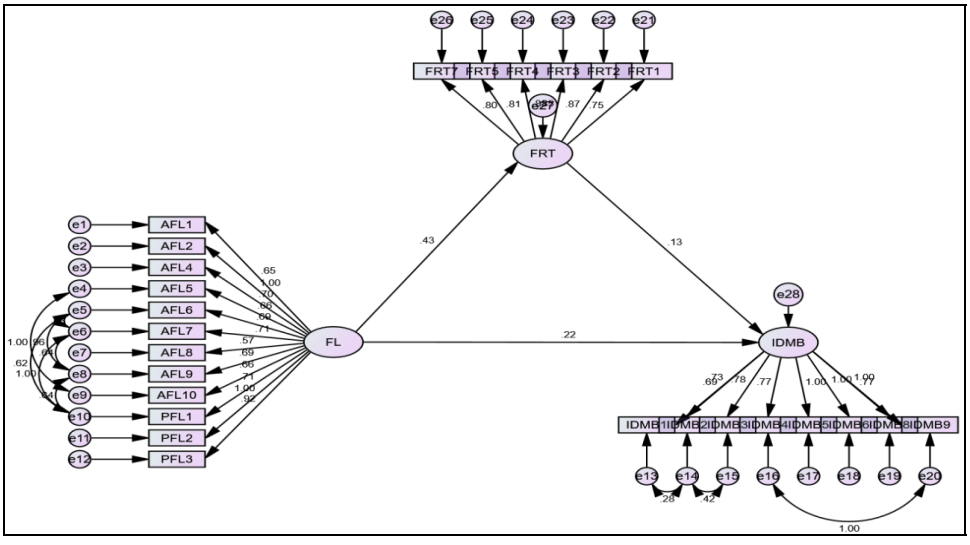
4 Results, analysis and discussion

A total of 382 questionnaires were received back from registered individual investors of PSX. Missing values and outliers were treated in data filtration process to avoid bias for statistical modelling. The remaining sample size was 357 for analysis of data and

interpretation. Normality, linearity and homoscedasticity tests were performed and indicated no violations and results meet the assumptions of multivariate analysis.

The demographics of the respondents revealed that 82.9% were males, 17.1% were females. The statistics indicates that majority of the respondents investing in PSX were males. Majority of respondents were in the age group of 26–35 years, i.e., 31.9%. The married people were 75.6% whereas single were 24%. In relation with employment structure, highest percentage was 58.3% who were full time salaried, followed by 21.0% self-employed. Finally, in type of investors, 55.7% were both short- and long-term investors, 26.9% were short-term investors and 17.4% were long-term investors.

Figure 1 Measurement model (see online version for colours)



4.1 Assessment of measurement model

EFA and CFA were conducted and results were found to meet the threshold values, i.e., 0.40. However, four items were suppressed due to cross loading or under the threshold value in EFA analysis. The assessment criteria of the measurement, convergent validity (item loadings, average variance extracted (AVE) and composite reliability) and discriminant validity (through square root of AVE) were found to be accurate and within range, i.e., less than 0.85

4.2 Measurement model fit

The measurement model is given in Figure 1 and fitness indices of the model are presented in Table 1.

Table 1 Structural equation model fit measures

Measurement model fit indices		
Statistics	*Fit indices*	*Model after modification in indices*
Goodness of fit	CMIN	766.743
	DF	286
	CMIN/DF	2.681
	AGFI	0.810
	GFI	0.845
	IFI	0.974
	TLI	0.971
	CFI	0.974
	NFI	0.959
Badness of fit	RMR	0.071
	RMSEA	0.069

Table 1 presents the results of measurement model, where the realisation of goodness of fit values is key. The values revealed in structural equation model fit measures for goodness of fit area χ^2/df = 2.681, AGFI = 0.810, GFI = 0.845, IFI = 0.974, TLI = 0.971, CFI = 0.974 and NFI = 0.959, which are within the acceptable range. Similarly, the values of badness of fit are RMR = 0.71 and RMSEA = 0.69, which are also within the threshold.

4.3 The structural model and hypothesis testing

This study consisted of three hypotheses which can be observed through the regression lines on the structural model. This study has answered two research objectives through these three hypotheses. Hypotheses 1 and 2 presents the direct and hypothesis 3 the mediating effect among the variables. The examination of direct relationships among IV and DV is essential to determine the full, partial or no mediation.

In relation with the direct impact, the relationship of FL with investment decision-making behaviour and FRT is presented as H_1 and H_2. Figure 2 present the AMOS structural model graphical representation of beta values and t-values.

Figure 2 Structural model – direct relationship of FL with IDMB and FRT (see online version for colours)

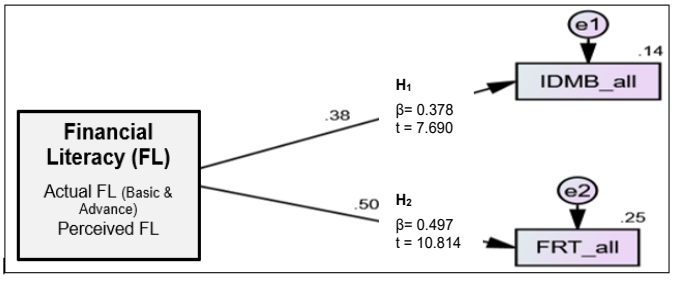


Table 2 Hypotheses testing H_1 and H_2 (direct effects)

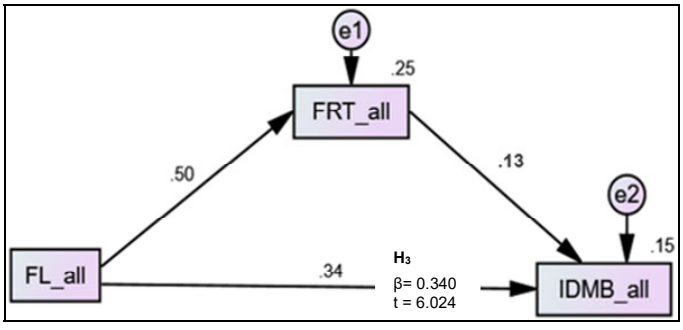
Hypotheses	*Relationships*	*Path coefficients*	*T-value*	*P-value*	*Results*
H_1	FL ➔ IDMB	0.378	7.695	0.000**	Supported
H_2	FL ➔ FRT	0.497	10.810	0.000**	Supported

Note: **P < 0.01; *0.05.

Table 2 indicates complete results of the H_1 and H_2 hypotheses testing. The path coefficient values, which are known as the standardised version of linear regression weight, determine the probable casual relationship among statistical variables. The beta values of H_1 and H_2 are $\beta = 0.378$ and $\beta = 0.497$ respectively. The t-values reveals the insights regarding the acceptance and rejection of a hypothesis. Threshold for t-value greater than 1.96 (for two tailed tests) indicates the acceptance of a hypothesis. Likewise, t-values attained for H_1 and H_2 were $t = 7.69$ and $t = 10.810$ respectively and significance levels of H_1 and H_2 were also at 0.000. Hence H_1 and H_2 were accepted and also these outcomes have indicated the positive direct relationship of FL with IDMB and FRT.

H_3 argued about the mediating effects of FRT in the relationship between FL and IDMB. Figure 3 indicates the mediating path between FL, FRT and IDMB (i.e., FL ➔ FRT ➔ IDMB).

Figure 3 Mediation analysis FL ➔ FRT ➔ IDMB (see online version for colours)



The values of the Table 3 indicated a significant path between FL ➔ FRT (i.e., $\beta = 0.497$, $P = 0.000$). Similarly, the path between FRT ➔ IDMB was also found to be significant (i.e., $\beta = 0.129$, $P = 0.030$). Likewise, the path FL ➔ IDMB was also established as significant (i.e., $\beta = 0.340$, $P = 0.000$). Moreover, when the direct path and the indirect path were evaluated, the value of indirect path ($\beta = 0.038$) was revealed as less compared with the direct path ($\beta = 0.340$). Hence, FRT was found to achieve the role of partial mediation in the relationship between and IDMB (i.e., FL ➔ FRT ➔ IDMB).

Table 3 Path analysis outcomes for FL ➔ FRT ➔ IDMB

Hypothesis	*Paths*	*Path coefficients*	*P*	*Effect*		
				Indirect	*Direct*	*Mediation*
H_3	FL ➔ FRT	0.497	0.000**	.340	.378	Partial
	FRT ➔ IDMB	0.129	0.030*			
	FL ➔ IDMB	0.340	0.000**			

Notes: **P < 0.01; *0.05; FL – financial literacy, FRT – financial risk tolerance, and IDMB – investment decision-making behaviour.

In view of these results, structural equation modelling (SEM) technique was used for model estimation and to examine the cause and effect relationships among the variables. Statistical significance and model fitness of the generated hypotheses were investigated in detail. This study tested three hypotheses of the study by applying AMOS. The complete assumptions of regression and SEM were fulfilled during the first stage. The determination of causality among the variables was examined through direct and indirect relationships. Initially, the direct relationships between the variables were examined to address the first research objective and indirect relationships (mediating) between the variables to address the second research objective.

The study proposed that FL facilitates the individual stock investors to make informed and educated investment decisions. The findings H_1 revealed that the standardised path coefficient FL ➔ IDMB is $\beta = 0.378$, $t = 7.690$ and $p = 0.000$. Therefore, the hypothesis is accepted that FL has a positive and significant relationship with IDMB. These results are supported by the prior findings, e.g., Allgood and Walstad (2016), Lusardi and Tufano (2015) and Clark et al. (2017). The evidences from the developed markets also support the relationship that FL has significant impact on equity investment, retirement planning, wealth management, saving and financial performance (Clark et al., 2017; Gupta and Gupta, 2018; Lusardi and Mitchell, 2014; Lusardi and Tufano, 2015; Van Rooij et al., 2011). In view of developing countries, e.g., China, UAE, India and Sri Lanka, studies revealed that financial awareness has huge role in investment decisions of investors (Al-Tamimi and Kalli, 2009; Chu et al., 2016; Jariwala, 2015).

Hypothesis H_2 of the study demonstrates that FL has a positive relationship with FRT of individual investors. The findings revealed that the standardised path coefficient FL ➔ FRT is $\beta = 0.497$, $t = 10.810$ and $p = 0.000$. Therefore, the hypothesis is accepted that FL has a positive and significant relationship with FRT. The findings support the results of prior studies on the relationship. Previous literature from developed and developing countries indicated a huge significance of FL for risk perception, risk taking behaviour of individuals' behaviour (Beal and Delpachitra, 2003; de Goeij et al., 2018; Gustafsson and Omark, 2015; Huzdik et al., 2014; Sjoberg and Engelberg, 2009). In relation with Pakistan, Ghaffar and Sharif (2016) argued that due to very low FL in Pakistan, PSX investors are incapable of effective management of risk.

Consistent with the findings of H_1 and H_2 and prior evidences, this study concludes that the FL has a significant impact on the IDMB among the individual investors of PSX. Hence, FL has been found to be a significant investment decision-making determinant for PSX investors. Therefore, improvement in financial knowledge can help the PSX investors in making educated and informed investment decisions. Similarly, FL has significant impact on FRT among individual investors of PSX. Hence, FL is

acknowledged as a most important determinant for FRT of PSX investors while making investment decisions.

The findings of Hypothesis H_3 indicated a significant path between FL ➔ FRT with its respective values, i.e., $\beta = 0.497$, $P = 0.000$. Similarly, the paths between FRT ➔ IDMB and FL ➔ IDMB were also significant with their values, i.e., $\beta = 0.129$, $P = 0.030$ and $\beta = 0.340$, $P = 0.000$ respectively. Moreover, the value of indirect path ($\beta = 0.340$) was revealed as less compared with the direct path ($\beta = 0.378$). Hence, FRT was found to achieve the role of partial mediation in the relationship between FL and IDMB (i.e., FL ➔ FRT ➔ IDMB).

Several studies have discussed that financially literate investors are highly risk tolerant while performing financial activities (de Goeij et al., 2018; Grable and Heo, 2017; Gustafsson and Omark, 2015; Sachse et al., 2012). For instance, Sachse et al. (2012) explained that FL has a significant impact on investment risk perception which leads to better decision-making. Results of this study are supported by the findings of Awais et al. (2016) and Nguyen et al. (2016), as FRT is a fundamental component in investment decision-making of individuals. Risk is an inherent feature of investment activities; therefore, a positive impact of FL on investment decision-making of individual investors in PSX is working through the mediating impact of their willingness to accept financial risk while making investment decisions. PSX is very difficult and complex due to high volatility (Amjad, 2010; Najaf and Ashraf, 2016), therefore the relationship among FL and IDMB is implausible without defining the mediating effect of FRT of individual investors in PSX.

5 Conclusions and implications

The current study attained its objectives. Based on empirical findings and discussion, this study has established that FL has positive and significant impact on IDMB and FRT among individual investors of PSX. The prior evidence also indicates that FL has significant impact on equity investment, retirement planning, wealth management, saving and financial performance (Clark et al., 2017; Gupta and Gupta, 2018; Lusardi and Tufano, 2015). Similarly, previous literature also indicated a huge significance of FL for risk perception and risk taking behaviour of individuals' behaviour (de Goeij et al., 2018; Gustafsson and Omark, 2015). This study also concludes that FRT mediates the relationship between FL and IDMB among individual investors of PSX. Therefore, FRT of individual investors facilitates and strengthens the relationship among FL and IDMB in stock market by accepting risk involved in equity investment. Various previous studies are supporting this conclusion that financially literate investors are highly risk tolerant while performing financial activities (de Goeij et al., 2018; Grable and Heo, 2017; Gustafsson and Omark, 2015; Sachse et al., 2012).

The study suggests that improvement in financial knowledge can help the investors in making educated and informed investment decisions. Moreover, an adequate FL can boost FRT of individual investors in PSX which further enhances the capability of investment decision-making process. The policymakers and PSX authorities can initiate the steps to increase FL. This can enhance awareness of finance, i.e., risk diversification, portfolio management, time value of money, interest rate of individual investors. The academia can also improve the level of FL and awareness among students (future

investors) by introducing financial subjects in their secondary level education. This will increase the personal savings and wealth accumulation of individuals which may lead to increase in national savings. These steps can also enhance the volume of investment in PSX, though it can achieve a substantial growth and development.

This study has some limitations like any other study. First, the study focuses on IDMB among individual equity investors of PSX. Therefore, findings of this research cannot be generalised to other segments of investors such as institutional investors, investment experts/professional of brokerage houses and money managers. Second, due to time constraints and scope of research, this study investigates FL including perceived and actual (basic and advanced), the most influential and relevant factor to decision-making behaviour of individual equity investors in PSX. To the end, the study is not generalisable to developed markets because of their different environmental and market conditions.

6 Future research

A productive future research can be conducted on institutional investors on the similar lines of this study. This study has explored the direct impact of FL on IDMB and FRT. However, future study can contribute considerably by investigating the direct impact of FL's dimensions i.e., actual (basic and advanced) and perceived on FRT and IDMB. Moreover, the mediation effect of FRT among dimensions of FL and IDMB can be explored in future. Investigating the impact of these individual components/ dimensions would contribute significantly to better understand the mediating role of FRT among the aforesaid relationships. Finally, the replication of the study on the culture and environment of other countries would be another valuable addition to generalise the research to other countries.

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