Financial Literacy, Behavior and Vulnerability Among Malaysian Households: Does Gender Matter?

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ABSTRACT

This study aims to identify the factors determining financial vulnerability among Malaysia households. A questionnaire-based survey was conducted using multi-stage sampling technique. In total, 578 useable responses were collected and data were analyzed using partial least square structural equation modeling. The empirical results revealed that i) financial literacy positively influenced financial behavior, ii) financial behavior negatively influenced financial vulnerability, iii) financial behavior mediates the relationship between financial literacy and financial vulnerability, iv) gender moderates the relationship between financial behavior and financial vulnerability. This study enriches the theoretical foundations of financial vulnerability through the exploration of mediation and moderation mechanism. Implications and future research suggestions are discussed.

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INTRODUCTION

One has to always recognise the general fact that financial vulnerabilities and adverse financial situations will continue to exist among households, either in developed or developing countries. To date, report has revealed that at a global level, there are billions of workers living at or below poverty line (World Bank, 2018). With the run-of-the-mill economic situation, an increasing number of families are experiencing financial difficulties, such as repaying debt, paying utility bills, and unable to make ends meet (Anderloni et al., 2012; Davies, 2019).

Although it is often believed that financial vulnerability is an issue particularly concerning households who are poor or uneducated (Lusardi and Mitchell, 2011b) but in fact, even the wealthy and highly educated can be financially vulnerable due to suboptimal financial attitude and lack of financial management capability (O'Connor et al., 2019). On top of that, both developing and developed countries are exposed to the threat of financial vulnerability. For instance, it has been reported that Americans have become increasingly vulnerable to financial distress due to problems such as job loss and income disruption (McCloud and Dwyer, 2011). Likewise, in Malaysia, from year 2015 to 2019, a total number of 80625 Malaysians have declared bankrupt (Carvalho et al., 2019). The bankruptcy rate of Malaysia, 0.36% is higher compared to that of developed countries such as Singapore with 0.31% and the United Kingdom, with 0.23% (Gazi, 2018).

Also, Lusardi and Tufano (2015) identified that even in a developed country like the United States, only one-third of respondents in the population are able to correctly understand how credit cards works as well as the application of the concepts of interest compounding in daily life. Similarly, in Malaysia, it has been shown that many people are lacking pertinent knowledge in financial economic concepts, specifically regarding stock markets, mutual funds, and compound interest (Boon et al., 2011). Such inadequacy in financial knowledge has put households into an even adverse situation, given that they lack the capability to cope with money management as well as financial market surrounding them. This is even truer given that financial products nowadays not only increase in quantity but also complexity, rendering the understanding of financial products more difficult and the associated risk higher.

Households who are financially vulnerable tend to engage in suboptimal financial choices, and they face greater risk of suffering financially (Hoffmann and McNair, 2018). Bad debt management is one of the major culprits of financial vulnerability. Highly indebted households are deemed to be "financially fragile'', in other words, they are more likely to default on their loan, particularly when facing income uncertainty, such as loss of jobs (Anderloni et al., 2012). Patel et al. (2012) indicated that experience of debt problems will persist and increase in the general population following the realization of global economic downturn. Moreover, the authors pointed out that debt problem faced by an individual in a household increases the likelihood of other individuals in the same household to experience the same. It is noteworthy that such problems are relatively more persistent and last longer compared to many other common life problems (Patel et al., 2012).

The consequences of financial vulnerability can range from individual to societal level (He et al., 2019). For instance, constantly facing financial difficulty elevates psychological stress level and reduce cognitive capacities (Aw and Sabri, 2020; Gathergood, 2012, Mullainathan and Shafir, 2013). As a result, several researches have declared the importance of looking into the phenomenon of financial vulnerability to aid the formulation of relevant policy interventions in helping consumers who are susceptible to financial hardships (Anderloni et al., 2012; Hoffmann and McNair, 2018). At a societal level, financial vulnerability also leads to family and relationship problems, such as domestic violence, separation, and divorce (Brown et al., 2010). In addition, as wealth of an economy and credit institutions are closely tied with individual households, household financial vulnerability can be influential to the financial stability of a country (Sánchez-Martínez et al., 2016).

Continuous growth of housing prices and household debt level has been witnessed in Malaysia economy in the past ten years (Daud et al., 2019). The household debt level is rated the highest among its neighbouring counties, such as Thailand, Indonesia, and Singapore (Loke, 2017). More importantly, a report by the central bank of Malaysia showed that 46.8% of household debt were for personal consumption and mainly serve the purpose of supporting individuals' desire lifestyle (The Star, 2019). The issue of financial sustainability is further exacerbated with the lower income levels in Malaysia compared to the developed countries. Can households afford to manage such high debts, either in short or long run? Correspondingly, it is unsurprising to see a high rate of bankruptcy in Malaysia (Loke, 2017). Also, it has been reported that less

than 10% of salaried Malaysians can sustain themselves for more than six months if they lose their jobs (Malaysian Financial Planning Council, 2018). All of the aforementioned facts pointing that the issue of financial vulnerability is getting worse and requires immediate attention in Malaysia.

Although increasing attention has been given to the area of consumer financial decision-making in general, much less efforts have been directed to household financial vulnerability (Hoffmann and McNair, 2018). Moreover, thus far, most of the studies have taken place in the developed countries (Patel et al., 2012) instead of developing countries like Malaysia. A specific view into these developing countries are worthy of note due to their distinct economic and social structure (Grohmann, 2018). Regional and cultural factors have been heralded as an emerging prominent subject in the personal finance literature (De Beckker et al., 2020; Falk et al., 2018). Cultural context embodies a set of belief and norms that are shared among members of a social group (Brown et al., 2018). Differences in cultural context can influence economic outcomes, including people's financial literacy and behaviour, largely through socioeconomic background, financial socialization, risk preference, and attitudes towards money (Brown et al., 2018; Falk et al., 2018; Yamauchi and Templer, 1982). For example, Petersen et al. (2015) delineated that people from countries characterized by the culture of high uncertainty avoidance use less credit. Another study by Chui and Kwok (2008) indicated that people resided in counties characterized by individualism tend to make more use of life insurance. Therefore, several well-tested effects documented in the Western context may not generalizable in developing countries like Malaysia. For instance, people from an individualistic cultural background are overconfident with their finance matters (De Beckker et al., 2020), thus they may not feel financially vulnerable even though they are not practicing sound financial behavior or equipped with adequate financial knowledge. On one hand, people in Malaysia tend to acquire financial knowledge and mould their financial behaviour through social norms and financial socialization agents, such as family, friends, or even religion (Sabri et al., 2012; Sharif and Naghavi, 2020). Correspondingly, the net impacts of financial literacy may be subtly different within the unique Malaysian sample. Therefore, we aim to bridge the gaps by identifying factors determining financial vulnerability in Malaysia context. In addition, many related studies have used students as sample, which overlooked the relevance of personal finance in an adult context (Jorgensen et al., 2017; Sabri et al., 2012). This potential drawback has raised the need of attention in the adult context, given that adults not only act as head of households but also expose to the financial market to a greater extent.

To this end, we follow Loke's (2017) suggestion to incorporate both cognitive factor (financial literacy) and behavioural factor (financial behaviour) in examining Malaysia household financial vulnerability. In particular, the inter-relationships between financial literacy, financial behaviour, and financial vulnerability remain underexplored (Noerhidajati et al., 2020). As exhibited in the literature, integrating financial knowledge, behaviour, and related outcomes together in a model will promote a comprehensive understanding of the subject matter (Sabri et al., 2020; Serido et al., 2013). In a similar vein, it has been advocated that more efforts are needed to understand how financial literacy and skill can improve financial security (Hira, 2012). On top of that, scant studies have examined the moderating role of gender on the relationships between financial literacy, financial behaviour, and financial vulnerability, which appear to be an important yet unaddressed gap in the literature (Tang et al., 2015). In this context, we seek to pursue answer to the question whether households' inadequate financial literacy lead them to perform negatively in managing personal finance, and subsequently incur financial vulnerability. Furthermore, we aim to uncover the potential heterogeneity by examining the moderating effect of gender in the proposed relationships using multigroup analysis. Other sections of this study are structured into hypotheses development and literature review (Section 2), research methodology (Section 3), data analyses procedure and results (Section 4), discussion (Section 5) as well as limitation and future research direction in Section 6.

CONCEPTUAL DEVELOPMENT

Family Resource Management Model

The research model of this study is underpinned by Family Resource Management Model introduced by Deacon and Firebaugh (1988). The model has been widely adopted and recognized by prior literature in personal finance (Hira, 2012; Mimura, 2014). The model illustrates a unified framework covering aspects of resource development, allocation, and management within the family. Three main elements were introduced,

namely input, throughput, and output, to explain how family plans and uses resources to meet demands in the consumption process. The three elements are suitably applicable to understand financial decision making and related outcomes (Van Campenhout, 2015; Xiao, 2008). To clarify, input refers to resources, such as individual skills and knowledge. Throughput refers to the process of planning and taking action to satisfy goals. Lastly, outputs refer to the outcomes of planning and action taken. It provides individual an overview of whether the goal is met (Deacon and Firebaugh. 1988). In the present study, financial literacy serves as input while throughput and output are represented by financial behavior and financial vulnerability, respectively. The input-throughput-output sequential process offers a theoretical ground for this study to examine the inter-relationships between financial literacy, financial behavior, and financial vulnerability.

Financial vulnerability

The term 'vulnerability' refers to experiencing contingencies and stress, and hardship in managing these (Chambers, 1989). Financial vulnerability is indicated by the inability to maintain stable condition in terms of saving, income, consumption expenses, and debt (Anderloni et al., 2012). It indirectly indicates the ability of households to buffer shocks encountered in life through material resources. Much works related to financial vulnerability has been done on the macro level, focusing on firms and countries (de Andres-Alonso et al., 2016; Kim and Ko, 2019). At a micro level, many studies have looked into the behavioral implication and negative consequences of financial vulnerability (Faulkner et al., 2019; He et al., 2019). For instance, the study by Meuris and Leana (2018) shown that financial vulnerability can indirectly result in accidents among truck drivers through the negative influence of working memory. However, thus far, not much attention has been given to the coping strategy of financial vulnerability, especially in developing countries like Malaysia.

Financial literacy and financial vulnerability

In the current study, financial literacy refers to the knowledge of financial concepts needed for households to make sensible financial decisions (Hilgert et al., 2003). Although the relationship between financial literacy and vulnerability has yet to be extensively examined, it is needless to stress the importance of financial literacy on households' financial vulnerability. Literature has established that financial literacy improves financial well-being (Abdullah et al., 2019; Nuradibah and Husniyah; 2016; Lusardi and Mitchell, 2011b; Chu et al., 2016). Traditional economic theory provides support to these findings as forward-looking individuals are able to utilize economic information to accumulate wealth effectively across lifespans (Behrman et al., 2012). Financial literacy can influence both assets and liability of households' balance sheet. It has been revealed that households with lower level of financial literacy tend to incur more costly mortgages (Moore, 2003). In addition, Huston (2012) found that financially literate people tend to pay below average interest rates than their counterparts, inferring that they are less susceptible to financial burden. Households with a higher level of financial literacy are likely to invest in a wiser manner, make good returns, and thus improve their financial wellbeing (Chu et al., 2016). Additionally, Steen and MacKenzie (2013) revealed that financial literacy helps to reduce financial stress and homelessness. Therefore, we posit that having high financial literacy reduce households' chance to become financially vulnerable.

H1: Financial literacy negatively influences financial vulnerability.

Financial behavior and financial vulnerability

In the present study, financial behavior is operationalized as specific actions of households pertaining to money management (Xiao, 2008; Chen and Lemieux, 2016). In general, financial behavior has been conceptualized as a multi-faceted construct that encompasses different behaviors within the area of financial market (Jorgensen et al., 2017). There are many different dimensions of behavior proposed in the literature, such as cash management, credit management, and retirement planning (Jorgensen et al., 2017; Stolper and Walter, 2017), and the selection of dimensions are normally based on researcher interest and context of study. Although the direct link between financial behavior and financial vulnerability has yet to be extensively established, one could expect the existence of relationship based on anecdotal evidences in the literature. According to Robb and Woodyard (2011), whether an individual is well-off in terms of financial is incumbent on their actions. For instance, it has been revealed that financial vulnerability is often incurred due to unwise borrowing choice, which causes households unable to cope with debts given their current and future level of

earning capacity (Anderloni et al., 2012). Non optimal and loosely planned expenditure put households into difficult financial situation, especially during sudden adverse events (Anderloni et al., 2012). In addition, it has been evidenced that financial behavior is negatively related to financial stress (Delafrooz and Paim, 2011). Likewise, Xiao et al. (2009) found that college students who engage in sound financial behavior are more satisfied with their financial status, and subsequently increase their life satisfaction. Therefore, we hypothesize that:

H2: Financial behavior negatively influence financial vulnerability.

Mediating role of financial behavior

Based upon the conventional economic approach to saving and consumption decisions, it is assumed that a rational and well-informed person will consume and save in a well proportionate adjusted to income (Lusardi and Mitchell, 2014). Often, sound execution of saving and spending requires households to possess certain level of financial knowledge and expertise (Lusardi and Mitchell, 2014). Therefore, it has been found that financial literacy is positively related to individual daily financial practices (Boon et al., 2011). The argument is supported by existing literature which indicates the possession of adequate financial literacy is necessary for effective money management. For instance, individuals with basic financial knowledge have better ability to keep track of their spending, to budget and save in addition to being more liable to make retirement plans (Lusardi and Mitchell, 2011a, 2011c). In addition, it has been found that individuals with greater financial literacy are more likely to pay credit card loans in full amount on time as well as having health and life insurances compared to their counterparts (Allgood and Walstad, 2016).

Based on the input-throughput-output mechanism in family resource management model, the impact of inputs on outputs is usually indirect (Beutler and Sahlberg, 1980; Deacon and Firebaugh, 1988). Therefore, we hypothesize that financial literacy influences financial vulnerability through financial behavior, suggesting the mediating role of financial behavior in work. To further explain, financial literacy enables and compels households to uphold sound financial behavior, such as keep track of cash and credit, and plan for retirement. These financial behavior in turn keeps households from falling into unsustainable financial situation and prepare them for unplanned or adverse financial situation, such as job loss. Based on the aforementioned reasonings, we hypothesize:

H3: Financial literacy positively influences financial behavior.
H4: Financial behavior mediates the relationship between financial literacy and financial vulnerability.

Moderating role of gender

The linkages between financial literacy, financial behavior, and financial vulnerability may not be as straightforward and simple as one think. In many instances, the potential issue of heterogeneity has been overlooked in the literature. Grounded in role theory which proposed that human behavior is guided by role expectations, such as men and women. Differences in gender role is likely moderate how financial literacy and behavior works (Ozmete and Hira, 2011; Tang et al., 2015).

In the present study, we posit that gender may moderate the relationships between financial literacy, financial behavior, and financial vulnerability. When comes to personal and household finance matters, women are reported to exhibit lower financial self-efficacy (Montford and Goldsmith, 2016). Financial self-efficacy denotes one's belief about his or her ability in managing and executing courses of action related to financial matters (Montford and Goldsmith, 2016). High financial self-efficacy tends to increase one's confidence level in performing financial behaviors and vice versa. Empirical study by Bannier and Neubert (2016) somehow supports the notion where the authors found that perceived financial literacy is insignificant in influencing women's investment decision. Therefore, we posit that for women, the impact of financial literacy is weaker and more unlikely to result in improved financial behavior and lower financial vulnerability.

Besides, the relationship between financial behavior and financial vulnerability might be influenced by gender role. Traditional belief of men and women social roles upholds that men are more likely to be perceived as responsible for providing resources for a household while women are assumed as more economic dependent. It has been shown that men, especially those who are married reported higher earnings. This can be largely attributed to the social role of men as bread winner in a family, while women are often taking the role

of family caretaker (Cunningham, 2008). As a result, men tend to deliberately find ways to increase their financial performance and productivity (Fan and Babiarz, 2019). Also, Aw et al. (2018) indicated that females are more susceptible to stress and anxiety, which could possibly affect the execution of their financial behavior. Based on these lines of reasoning, we hypothesize:

H5: *Gender moderates the relationship between financial literacy and financial vulnerability. The relationship between financial literacy and financial vulnerability is stronger for male.*

H6: *Gender moderates the relationship between financial behavior and financial vulnerability. The relationship between financial behavior and financial vulnerability is stronger for male.*

H7: *Gender moderates the relationship between financial literacy and financial behavior. The relationship between financial literacy and financial vulnerability is stronger for male.*
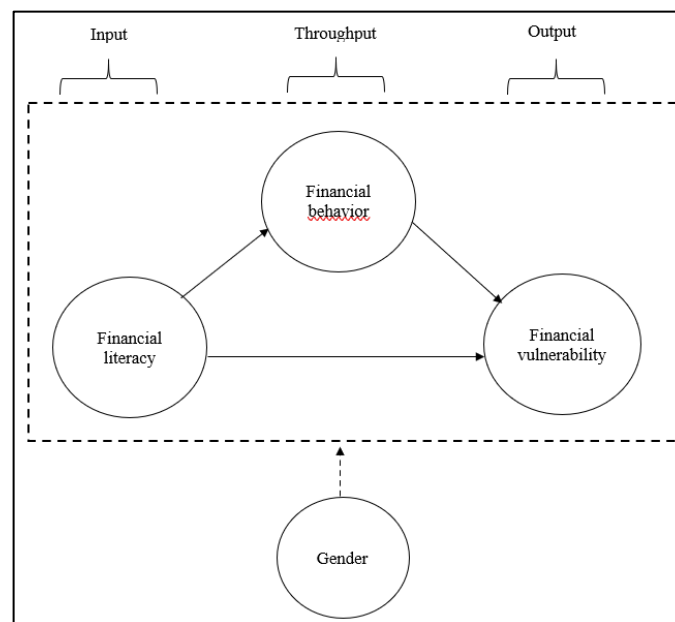

Figure 1 Research Framework

RESEARCH METHODOLOGY

Sample and data collection

A cross-sectional survey design was employed to collect the data. A series of pre-tests were conducted to ensure the validity and reliability of the questionnaire prior to the actual data collection. Five academics and industrial experts were invited to discuss and validate the questionnaire items. Subsequently, 15 prospective participants were invited to participate in a face-to-face in-depth interview for identifying potential issues, such as questionnaire format and design, wording, instrument clarity, and time of completion. Minor changes regarding questionnaire layout and wording were made based on the suggestions obtained from the pre-tests.

The sample was selected through multi-stage sampling. Following past studies conducted in Malaysia (Aw and Sabri, 2020; Sabri and Aw, 2020), in the first stage, five zones in Malaysia were classified (i.e. Central, Southern, Northern, and Eastern zones of Peninsular Malaysia, and East Malaysia). At the second stage, a list of government departments in each zone was obtained from government websites. Four departments were randomly selected from the list. Thirty respondents from each department were targeted to fill up the questionnaire. In total, each zone gives 120 responds, yielding a total of 600 responses with five zones. After removing responses with missing values and straight-lining issues, 578 usable responses were collected. The selection of civil servants was relevant due to the fact they represent a major portion of Malaysia population. Also, report has shown significant number of civil servants declared bankrupt, and the number is rising (Bernama, 2019), indicating this group of samples is particularly needed attention in terms of financial vulnerability issue.

In terms of gender, 42.4% of the respondents were male and 57.6% were female. As for ethnicity, the majority of the respondents (92.6%) were Malay, 2.7% were Chinese, 2.2% were Indians and 2.4% of the respondents were of other ethnicities. In terms of age, most of the respondents were in the age range of 30 to 39, followed by 23.4% in the age range of 20 to 29, and 15.1% in the age range of 40 to 49. 42.4% of respondents have monthly income of less than RM3000, followed by 35.8 who earned between RM3,000 and RM4,999, and 17.5% who earned between RM5,000 and RM6,999. To note, according to the annual Salaries & Wages Survey Report Malaysia 2018, RM3000 is the mean salary in Malaysia.

Measures

The measurement scale for financial vulnerability scale was adapted from Van Aardt and Moshoeu (2009) and Anderloni et al. (2012), covering four aspects, namely income, saving, consumption expenditure, and credit. Items were rated in a 10-point Likert scale, from 1=very stable to 10= very unstable. Higher score on these questions indicate greater financial vulnerability. The measurement scales of financial literacy and financial behavior were adapted from nation-wide study by Malaysian Financial Planning Council (2018) which designed specifically to suit Malaysia context. Financial literacy was measured through true/false questions, the number of questions answered correctly determine respondents' financial literacy level. The measures have been adopted and validated in prior Malaysia-based personal finance studies (Sabri and Aw, 2019; 2020). Financial behavior comprised of three dimensions, namely cash management, credit management, and retirement planning, rated in a 5-point Likert scale, from 1=never to 5= always. Higher score on these questions indicate better financial behavior performed by respondents.

DATA ANALYSIS PROCEDURE

Common method bias

Due to the cross-sectional nature of the study, the presence of common method bias may distort the findings. To address this issue, we deployed procedural and statistical remedies to ensure the threat of common method bias is minimized. In terms of procedural remedy, various scales in the instrument was used. For example, financial behavior was measured with a 5-point Likert scale, financial vulnerability was measured with a 10-point Likert scale, and financial literacy was measured with true/false format questions (Podsakoff et al., 2012). With regards to statistical remedy, by employing Harman's single factor test, we found that a single factor explicated 14.05% of the overall variance, indicating that common method bias is unlikely a threat in the present study (Podsakoff et al., 2012). Besides, we performed a full collinearity test, and found that the maximum pathological variance inflation factor (VIF) value for all constructs was 1.10, well below the threshold of 3.3 (Kock, 2015).

Multivariate normality

In order to assess the multivariate normality, we employed the Web Power online tool (https://webpower.psychstat.org/models/kurtosis/) as it offers the results of skewness and kurtosis coefficients along with the p-value for the data set. The results revealed that the p-value for the Mardia's multivariate skewness and kurtosis coefficients are less than 0.05 (Cain et al., 2017), indicating the data was not normally distributed, prompting the selection of non-parametric analysis tool, that is , the Partial Least Square-Structural Equation Modeling (PLS-SEM) to test the proposed research model.

Partial Least Square-Structural Equation Modeling (PLS-SEM)

PLS-SEM is suitable to the current study because of its ability to predict and explain (Hair et al., 2019). In addition, PLS-SEM is less restrictive in terms of distributional assumption, which is not realistic in the realm of social science (Hair et al., 2019). Also, PLS-SEM offers greater degress of statistical power (Hair et al., 2019). In executing PLS-SEM, we followed the two-stage approach proposed by Anderson and Gerbing (1988), of which the measurement model is assessed prior to structural model.

Measurement model

The assessment of measurement model was conducted by checking internal consistency reliability, convergent validity, and discriminant validity. In terms of internal consistency reliability, most of the indicators loadings and composite reliabiltiy were higher than minimum threshold of 0.70 (Hair et al., 2019). Average variance extracted (AVE) was higher than 0.50 for both male and female sample after a few items with low indicator loading from credit management and retirement planning were dropped. To note, items with outer loadings below 0.70 but above 0.40 were not deleted because the deletion does not lead to an increase in composite reliability and AVE (Hair et al., 2019). Overall, it can thus be concluded that convergent validity was established. Next, the discriminant validity was evaluated following the HTMT criteria proposed by Henseler et al., (2015). As exhibited in Table 2, all ratios were below the 0.85 (Kline, 2011), indicating the establishment of discriminant validity.

Table 1 Measurement model

Construct/ Associated Items	Loading		CR		AVE	
	Male	Female	Male	Female	Male	Female
Cash Management			0.839	0.866	0.519	0.572
CM1	0.484	0.563				
CM2	0.598	0.598				
CM3	0.835	0.862				
CM4	0.827	0.883				
CM5	0.789	0.814				
Credit management			0.854	0.859	0.597	0.607
CRM1	0.672	0.624				
CRM2	0.893	0.876				
CRM3	0.822	0.826				
CRM4	0.681	0.728				
Retirement planning			0.863	0.877	0.614	0.642
RP1	0.736	0.840				
RP3	0.820	0.761				
RP4	0.889	0.859				
RP5	0.673	0.739				
Financial vulnerability			0.883	0.902	0.655	0.697
FV1	0.788	0.859				
FV2	0.879	0.882				
FV3	0.838	0.843				
FV4	0.722	0.750				

Note: CR (Composite Reliability), AVE (Average Variance Extracted)

Table 2 Discriminant validity

	Male				Female			
Constructs	CM	CRM	RP	FV	CM	CRM	RP	FV
CM								
CRM	0.196				0.290			
RP	0.556	0.311			0.348	0.232		
FV	0.570	0.306	0.321		0.426	0.199	0.213	

Note: HTMT< 0.85 (Kline, 2011); CM (Cash Management), CRM (Credit Management), RP (Retirement Planning), FV (Financial Vulnerability)

To estimate the model, financial behavior was modelled as a second-order contructs comprising of three dimensions, namely cash management, credit management, and retirement planning. Assessment of collinearity of formative indicators revealed highest variance inflation factor (VIF) value of 1.27, well below the threshold of 3.3 (Hair et al., 2019). Subsequent analysis indicated that the indicators have sufficient weight (CM: 0.681; CRM: 0.410; RP: 0.343, p< 0.01).

Structural model

Adhering to the recommendation of Hair et al. (2019), multicollinearity issue was examined before testing signficance and relevance of relationships. Maximum VIF value of 1.01 was revealed, below the minimum threshold of 3.3, indicating multicollinearity is not a threat in this dataset. Results indicated that financial literacy significantly influences finanicial behaivor (β= 0.105, p< 0.05) but not financial vulnerability (β= 0.010, p> 0.05). Finanical behavior significantly influences financial vulnerability (β=-0.485, p< 0.01). Subsequently, we tested the hypothesized mediation effects using a bias-corrected bootstrapping of indirect effects following the approach suggested by Preacher and Hayes (2008). The mediating effect of financial

behavior in the relationship between financial literacy and financial vulnerability was verified (β=-0.05, p< 0.05, Confidence interval (CI)= [-0.10, -0.01]). With the significant indirect effect and insignicant direct effect of financial literacy on financial vulnereability, a full mediation was evidenced. The model exhibited R^2 of 0.235, suggesting sufficient in-sample predictive power (Hair et al., 2019).

Multigroup analysis (PLS-MGA)

Based on the recommendation by Henseler et al. (2016), the acceptability of the measurements models and measurement invariance should be established before the execution of multigroup analysis. In the present study, we adopted the measurement invariance of composites (MICOM) to assess measurement invariance (Henseler et al., 2016). A three step process was involved: i) the configurational invariance assessment, ii) the compositional invariance assessment and iii) the assessment of equal means and equal variances. Firstly, the configural invariance was established owing to the identical measurement model assessment and adjustment for both female and male groups, as executed in the earlier stage.

Secondly, we ran the permutation test with 1000 permutations and a 5% significance level. As shown in Table 3, result suggested that compositional invariance was established as c exceeds the 5% quantile of c_u, and permutation p-values are greater than 0.05. Therefore, compositional invariance was established. Thirdly, we checked the invariance of the composite mean values and variances. As exhibited in Table 4, the results indicated equal composite variance and unequal composite mean. To explain, composite invariance is achived if the original mean difference falls in to the boundaries of the 95% confidence interval (Henseler et al., 2016). Since partial measurement invariance was established, subsequent multigroup analysis was warranted. Table 5 indicated that there was a significant difference in terms of path coefficient of financial behavior-financial vulnerability link between male and female. Particularly, the path coefficient is weaker for female (Male β= -0.561, Female β= -0.417, $p<$ 0.05).

Table 3 Results of partial invariance measurement testing

Constructs	Configural Invariance	Compositional Invariance (Correlation=1)			Partial Measurement Invariance Established
		C=1	5% quantile of c_u	Permutation p-value	
FB	Yes	0.996	0.931	0.771	Yes
FV	Yes	0.999	0.996	0.364	Yes

Note: FB (Financial behavior), FV (Financial vulnerability)

Table 4 Result of full measurement invariance testing

Constructs	Equal Mean		Equal Variance		Full Measurement Invariance Established
	Differences	Confidence Interval	Differences	Confidence Interval	
FB	**-0.372**	**[-0.140, 0.141]**	0.034	[-0.217, 0.220]	No
FV	**-0.235**	**[-0.134, 0.141]**	0.007	[-0.192, 0.190]	No

Note: Violations of full measurement invariance are printed in bold. FB (Financial behavior), FV (Financial vulnerability)

Table 5 Results of multigroup analysis

Hypothesis	Relationships	Path Coefficient (Male)	Path Coefficient (Female)	CIs (Bias corrected) Male	CIs (Bias corrected) Female	Path coefficient differences	P-value	Supported
H1	FL→FB	0.017	0.131	[-0.111; 0.135]	[0.022; 0.235]	0.114[ns]	0.126	No
H2	FB→FV	-0.561	-0.417	[-0.621; -0.481]	[-0.495; -0.308]	0.144[*]	0.024	Yes
H3	FL→FV	-0.032	0.036	[-0.121; 0.064]	[-0.045; 0.120]	0.068[ns]	0.183	No

Note: * $p<0.05$, ns (not significant), CI (Confidence Interval), FL (Financial Literacy), FB (Financial Behavior), FV (Financial Vulnerability)

Importance performance map analysis (IPMA)

As suggested by Ringle and Sarstedt (2016), we performed a follow-up IPMA analysis to further explore the findings. The primary purpose of IPMA is to identify predictors that have high importance for the target variable but yield relatively low performance, thereby offering insight for managerial actions (Ringle and Sarstedt, 2016). First, we rescaled all the indicators to ensure same scale direction. Second, we modeled financial vulnerability as our target variable predicted by two predecessors, namely financial literacy and financial behavior. Results revealed that financial literacy exhibited low importance score (0.040) and an average performance score of 57.708. More importantly, financial behavior showed significantly higher importance score of 0.561 and similar performance score of 57.923 in comparision to financial literacy, thereby highlighting the prominent role of financial behavior. We took a step forward to execute IPMA at

indicator level. As shown in Figure 2, we found that cash management is the most important indicator in determining financial vulnerability (importance score= 0.331) yet only averagely performed (performance score= 62.113), thereby requiring further attention from households.
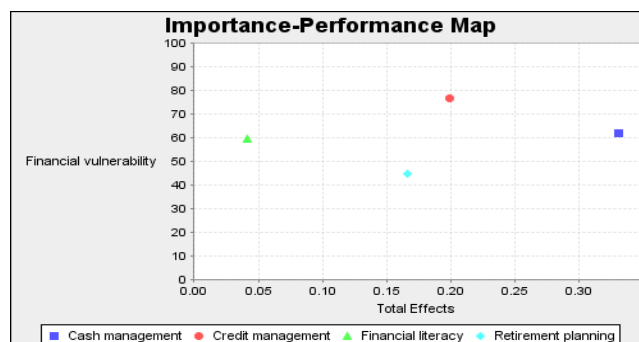

Figure 2 Importance-performance map

DISCUSSION

Firstly, this study finds significant effect of financial literacy on financial behavior, in line with prior literature (Robb and Woodyard, 2011; Henager and Cude, 2016; Grohmann, 2018). Our findings support the idea of what households know influences what they do. Having greater financial literacy empowers households to manage money related matters in a wiser manner. More specifically, their knowledge such as understanding in financial ratio calculation, investment products available, and associate risks allow them to plan and execute relevant financial behavior more professionally. This also explains the reason that financial education program has great impact on financial behaviors, particularly obvious for behavior that feasibly altered in the short run (Lyons et al., 2006).

Secondly, we find a rather surprising insignicant impact of financial literacy on financial vulnerability. The finding corresponds to Schmeiser and Seligman (2013) who articulated that correcly answering difficult financial questions does have effect on financial capacity but does not necessarily transfer into positive financial outcomes, such as wealth. We argue that impact of financial literacy on financial vulnerability is not direct because it is counter-intuitive to see that having high level of financial knowledge can directly alter one's current financial situation.

The finding of mediation test substantiates our argument earlier, of which financial literacy helps to overcome financial vulnerability through financial behavior. Signficant indirect effect detected indicates that households who possess high level of financial literacy needs to take a step further by leveraging their financial knowledge to plan and execute sound financial behaviors, in good agreement with prior literature (Allgood and Walstad, 2016; Clark et al., 2017). For instance, Clark et al. (2017) shows that worker who are highly literate tend to participate in pension plan and possess more equity in their retirement accounts, which in turn reinfore their retirement preparedness. To reiterate, having high level of finanical literacy does not safeguard them from being financially vulnerable. Instead, knowledge and behavior are inter-connected (Sabri and Aw, 2020; Husniyah et al., 2017), effective action planned and taken based on sophisticate knowledge is imperative for keeping financial vulnerability away.

Lastly, multigroup analysis revealed a signficant difference in the relationship between financial behavior and financial vulnerability between male and female households. However, the financial literacy-financial behavior relationship and financial literacy-financial vulnerability are not signficantly different for male and female households. Interestingly, the findings indicate that the negative impact of financial behavior on financial vulnerability is stronger for male households. The findings may be partly attributed to the fact that men are more likely to make the majority of financial decisions in a households. Hence, their financial behavior carries more weight in determining household financial vulnerability. On top of that, women tend to exhibit personal traits and buying behavior, such as neuroticism and compulsive purchase (Aw et al., 2018), which may interfere with the process of practicing sound financial behavior, thus reduce the effect of financial behavior on financial vulnerability for female households.

Theoretically, the present study adds to the existing literature in twofolds. First, this study uncovers the inter-relationships (mediating mechanism) between financial literacy, financial behavior, and financial vulnerability. Although past studies have delineated the direct effects between financial literacy and financial behavior, the inter-relationships between financial literacy and financial behavior in relation to financial vulnerability is still poorly understood (Ali et al., 2019; Noerhidajati et al., 2020). Correspondingly, the mediation test provides a more solid evidence and deeper understanding on the theoretical mechanism of how financial literacy can affect households' financial vulnerability, suggesting that financial literacy alone is inadequate to prevent negative financial outcomes if the knowledge cannot be effectively translated into actual behavior. Secondly, applying-state-of-the art PLS-MGA further unmasks the moderating role of gender in the relationship between financial behavior and financial vulnerability, providing some insights into the role of individual differences in influencing effectiveness of financial behavior. The finding complements past research that often overlooked the issue of sample heterogeneity in approaching the phenomenon, by evidencing that the financial behavior-financial vulnerability link is not always constant and may be subjected to certain boundary conditions, such as gender in this study.

CONCLUSION

To reiterate, the main purpose of this study is to identify the factors determining financial vulnerability among Malaysia households. This study also seeks to identify the heterogeneity role of gender in the inter-relationships between financial literacy, financial behavior, and financial vulnerability. By adopting a questionnaire-based survey with multistage sampling technique, a total of 578 usable responses were collected from Malaysian households. Two main findings were revealed: (i) financial behavior mediates the relationship between financial literacy and financial vulnerability and (ii) gender moderates the relationship between financial behavior and financial vulnerability, of which the negative impact of financial behavior on financial vulnerability is stronger for male households.

Practically, continuous education needs to be provided for Malaysian households to help them perform better in financial behavior, and thus reducing chance of facing financial vulnerability. To increase the effectivenss, relevant education should be imparted at younger age (Mandell and Klein, 2009). Moreover, financial education program should cover a wider array of financial matters instead of mere saving and spending, given the current situation in Malaysia where households are incurring excessive debts and investing in an unprofessional manner (Albaity and Rahman, 2012; Daud et al., 2019). Currently, formal training to develop and improve financial literacy remains insufficient in Malaysia. Notably, the significant mediating effect of financial behavior suggesting that relevant hands-on based financial program or workshops should be conducted in helping households to put their financial knowledge into use. Executing sound financial behavior is the key to curb financial vulnerability instead of merely possessing high financial literacy. It is important to note that some of the programs or workshops should be female tailored in identifying the weakness or interference of female households' financial behavior. This is of importance given that female households may start to take over more financial decisions in a household in the near future following the changes in Malaysia social and economic structure.

Financial behavior and financial vulnerability can be influenced by many other personal (i.e. personality) and environmental factors (i.e. economic condition). Future studies are suggested to incorporate both of these factors simultaneously into the model for a more advanced understanding. Secondly, financial literacy probably instills greater confidence in households (Sabri and Aw, 2019), which could possibly lead to positive and negative outcomes, especially when overconfidence comes into effect. Pertinent issue should be probed further for a deeper understanding. Thirdly, it is also interesting for future studies to examine the cognitive, psychological, and behavioral consequences of financial vulnerability.

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APPENDIX

Apendix 1: List of instruments

Financial literacy
The longer the repayment period, the lower the cost of the overall loan.
One needs to save before spending.
All types of investments are profitable and low risk.
All types of investments in Malaysia are legal.
One can depend on EPF savings for living after retirement.
Private Retirement Scheme (PRS) is only for government employees.
Every working adults must pay income tax.
Only salary is subject to tax.
Profit from investment is not taxable.
Individuals who pay zakat does not have to pay income tax.
All types of risk can be insured.
If I could bear the risk, I don't have to buy insurance.
Wills cannot be modified once it's written.
My will may include the EPF and the insurance nomination.
I can distribute all my assets through my will.
Shariah products generate reasonable returns similar to conventional products.
Shariah products are free from risk.

Cash management
I spend accordingly to a weekly or monthly budget.
I use a bank account that has a profit interest rate.
I estimate household income and expenses.
I record how and where my money is spent.
I always set aside money for big expenses in the future.
I always set aside money for unexpected expenses in the future.
I started and maintained an emergency savings fund.
I save for long term goals like car, education and house.

Credit management
I compare credit receipts with monthly statements.
I do not pay the loan balance in full but only make a minimum or partial payment. (Reverse coded)
I accumulate debt every year to pay off my previous debt. (Reverse coded)
I took a cash advance from credit card to pay off my loan balance. (Reverse coded)
I receive overdue notices for late or overdue payment. (Reverse coded)

Retirement planning
I contribute to private retirement savings plan
I use licensed financial planner or advisor to plan for retirement
I use the interest earned from savings to start retirement savings.
I set a specific goal for the amount to save for retirement.
I discuss retirement plans with spouse, friend or others.

Financial vulnerability
Current income situation.
Current ability to save.
Ability to meet daily needs.
Current credit status.