

Risk Tolerance and Financial Knowledge in Retirement Preparedness: A Conceptual Framework Based on Prospect Theory for Malaysia's Low-Income Workers

Nur Diyana Yusoff^{1*}, Shafinar Ismail², Noraznira Abd Razak³, Nor Shahrina Mohd Rafien⁴, and Azreen Roslan⁵

^{1,2,5}Universiti Teknologi MARA, Kampus Puncak Alam, Malaysia

^{3,4}Universiti Teknologi MARA, Kampus Melaka, Malaysia

*Corresponding Author

DOI: <https://dx.doi.org/10.47772/IJRISS.2025.909000483>

Received: 10 September 2025; Accepted: 16 September 2025; Published: 15 October 2025

ABSTRACT

Retirement marks the transition from active employment to the end of an individual's working life. This is the period of life where individuals rely on accumulated savings or pensions to fund their daily lives. The increase in life expectancy, the ageing population, and the rise of pensioners with inadequate savings highlight the significance of retirement, particularly for low-income groups. In Malaysia, the situation is exacerbated by the current economic uncertainty, rising living costs, and data indicating that a significant portion of the B40 population has insufficient Employees Provident Fund (EPF) funds to support themselves even a few years after retirement. These issues highlight the importance of preparing individuals with low incomes for retirement at an early stage of their careers. The foundation of this study will be grounded in Prospect Theory, which elucidates financial decision-making in uncertain conditions. The paper examines the direct relationship between risk tolerance and retirement preparedness, with financial knowledge serving as a mediator. The proposed framework aims to clarify behavioral responses to financial risk and the importance of financial knowledge in improving retirement outcomes among low-income populations. By integrating behavioral finance principles, this study aims to contribute to the academic literature and provide actionable insights for interventions that promote financial well-being and retirement security among low-income groups. This conceptual paper makes three key contributions. First, it extends Prospect Theory to the low-income group in Malaysia. Second, it positions financial knowledge as a mediating factor between risk tolerance and retirement preparedness. Lastly, it provides practical implications for policymakers, financial educators, and industry practitioners to address retirement insecurity among low-income groups in Malaysia. The framework also lays the groundwork for future empirical validation.

Keywords: low-income, financial knowledge, Prospect Theory, retirement preparedness, risk tolerance.

INTRODUCTION

Retirement preparedness has become an increasingly critical issue, particularly in developing economies where social safety nets are limited. On top of that, the individuals in the developing economies also need to bear the primary responsibility for securing their financial future (Lusardi & Mitchell, 2017). In Malaysia, the challenges are especially acute for the low-income group, also known as the B40 group, representing the bottom 40% of income earners, those who often experience unstable income streams, limited access to

diversified financial products, and a persistent lack of financial literacy (Employee Provident Fund, 2023; Chek & Ismail, 2023). These socioeconomic constraints are compounded by behavioural tendencies, such as low risk tolerance and insufficient long-term financial planning, which further hinder the accumulation of adequate retirement savings (Gryphon, Lee, & Croy, 2012).

Malaysia's retirement landscape is undergoing significant structural shifts, marked by the gradual transition from defined benefit (DB) schemes to defined contribution (DC) plans. Government pensions represent the DB, and DC is represented through mechanisms like the Employees Provident Fund (EPF) and supplementary voluntary schemes such as the Private Retirement Scheme (PRS). This movement places increasing responsibility on individuals to manage and sustain their retirement savings, as they will get the money in a lump sum as compared to the monthly payments offered by the pension. (Yusoff et al., 2024; Employees Provident Fund, 2024; Bank Negara Malaysia, 2022). However, recent statistics from the EPF reveal that a significant proportion of low-income individuals have dangerously low savings. Furthermore, many are depleting their EPF funds within just a few years after retirement (EPF, 2023). This situation is further exacerbated by the impact of COVID-19, where extensive early withdrawals were made from retirement accounts, especially among low-income and middle-income groups (Tan, Carvalho, & Rahim, 2023).

Behavioural finance offers valuable insights into understanding financial decision-making among low-income earners. This study focuses on individual risk tolerance, which can be defined as one's willingness to engage with financial uncertainty. This article presents a conceptual framework that is guided by Prospect Theory (Kahneman & Tversky, 1979). According to the Prospect Theory, individuals are generally loss-averse, especially when faced with high-stakes decisions that could result in financial loss. She et al. (2023) stated that this cognitive bias may lead individuals with low income to avoid investment instruments perceived as risky, even if the options give higher returns in the long term. Consequently, the aversion to loss can be detrimental to effective retirement planning as it hinders the individual from accumulating more savings in the future. This is crucial, especially in environments where mandatory contributions alone are insufficient (Andonov, Bauer, & Cremers, 2017).

This study incorporates financial knowledge as a mediating variable in order to minimize the behavioural challenge being investigated. Having a solid understanding of finance plays a pivotal role in reducing risk aversion. Furthermore, it also enables individuals to make informed decisions regarding financial matters such as savings, investment diversification, and withdrawal strategies (Lusardi & Mitchell, 2014; Brown et al., 2011). According to the Organisation for Economic Co-operation and Development (2013), a financially literate person is more likely to understand the time value of money, inflationary pressures, and the risks and benefits associated with various retirement strategies. Therefore, financial knowledge can help low-income workers to overcome psychological barriers by filling cognitive gaps and reducing behavioural barriers. Therefore, despite the fact that they have a limited income this will eventually enhance their preparation for retirement.

This conceptual model contributes to the broader discourse on retirement security by integrating insights from behavioural finance and empirical research within the Malaysian context. Unlike previous studies that predominantly draw from the Theory of Planned Behaviour (TPB) to examine social and attitudinal drivers (Kimiyaahlam et al., 2019), this paper leverages Prospect Theory to emphasise the cognitive dimensions of financial decision-making. The model acknowledges that even with positive social influence and intention, behavioural biases like loss aversion can persist unless moderated by sufficient financial understanding (She et al., 2023).

As Malaysia's population continues to age and the ratio of retirees to active workers increases, ensuring retirement preparedness for all socioeconomic strata becomes a national imperative (Department of Statistics Malaysia, 2023; United Nations, 2024). The consequences of inadequate savings extend beyond individual hardship. It also affects national productivity, healthcare systems, and intergenerational dependency (Teh, Tey,

& Ng, 2014). Thus, understanding how psychological traits like risk tolerance interact with financial knowledge offers practical value for policymakers, financial educators, and industry practitioners aiming to design effective interventions. This paper sets the stage for future empirical analysis that will validate the proposed framework and contribute to evidence-based policy formulation to support the retirement preparation of Malaysia's low-income private-sector workers.

LITERATURE REVIEW

Retirement Preparedness among the Low-Income Group

Retirement preparedness is a critical issue, particularly for low-income groups who often lack adequate resources and knowledge to plan effectively for retirement. This section analyses the factors influencing retirement preparedness within Malaysia's low-income demographic, highlighting the roles of socioeconomic status, financial literacy, and financial stress. Siwar et al. (2019) indicate that the low-income demographic often faces multiple financial challenges. This encompasses debt obligations, diminishing funds before the next pay cheque, insufficient savings, and rising expenses. Recent data indicate that individuals with low income who do not engage in adequate retirement planning are likely to require financial assistance from the government and other entities post-retirement.

The Department of Statistics Malaysia (2023) indicates that the median monthly household income for the low-income group in 2022 was RM3,401, reflecting their constrained capacity for long-term savings accumulation. Employees Provident Fund (EPF) reveals that, as of 2024, only 18% of its members attained the fundamental savings benchmark of RM240,000 by age 55, underscoring prevalent retirement unpreparedness. Furthermore, the data from the Malaysian Research Institute on Ageing (MyAgeing) previously found that 31.2% of elderly adults in Malaysia belonged to low-income households. The Social Welfare Department also reported that over 143,499 elderly individuals living in extreme poverty were getting Bantuan Warga Emas (BWE) cash assistance amounting to RM500 every month (Yusoff et al., 2024; Bernama, 2023).

Data from the World Bank (2021) highlighted that communities with lower incomes are especially susceptible amid economic disruptions, including pandemics. The COVID-19 pandemic has resulted in numerous Malaysians being pushed into lower-income demographics as a result of income reduction, business failures, and unemployment. These circumstances directly impact the livelihoods of Malaysia's B40 communities. According to Rapi et al. (2022), many Malaysians suffered a loss of income due to their work contracts being terminated, their firms being forced to close, or being placed on unpaid leave. Due to this, the government allowed the withdrawal of the EPF money, which further drained the little savings that they had in their EPF retirement savings account. Financial literacy is essential for the management of savings, investments, and income, especially in preparation for retirement, and especially for the low-income groups. A lack of financial literacy is associated with diminished income and savings potential, which will adversely affect persons' quality of life and financial security (Abdullah, 2021; Kimiyaghalam & Yap, 2017). Idris et al. (2013) assert that insufficient financial knowledge contributes to financial difficulties and adversely influences income management and security decisions, especially regarding retirement and emergencies. Furthermore, fundamental financial knowledge also enhances individuals' everyday financial activities. This includes budgeting, savings, investing, retirement planning, and estate planning (Boon et al., 2011; Lusardi & Mitchell, 2014).

According to Bianchi (2018), low financial literacy hinders effective financial decision-making and heightens vulnerability in investment returns, especially for low-income households. Individuals in these groups have a high risk of financial illiteracy due to several factors, which include inadequate financial education and substandard educational quality. As a result, they may find it challenging to comprehend fundamental financial concepts, which in turn contributes to financial insecurity. This will eventually impede their retirement planning as compared to individuals in higher-income brackets (Potrich, Vieira, & Mendes-Da-

Silva, 2016; Baron, 2015). Therefore, financial literacy is essential for low-income families to enhance their long-term financial well-being and make informed financial decisions, including preparing financially for retirement.

According to Mansor et al. (2022), financial well-being has a relationship with multiple factors, including financial stress, locus of control, work environment, and financial behaviour. Suprpto (2020) stated that financial stress occurs when individuals are concerned and worried about their current financial condition. This includes the inability of an individual to cover essential expenses, like food and rent, pressure from debt, rising living costs, and lack of savings. Yusof et al. (2018) highlight that the high cost of living increases debt levels among B40 households. Low levels of financial literacy exacerbated by financial insecurity have further contributed to financial stress and impacted socio-economic status (Kimiyaaghalam & Yap, 2017). Higher financial stress correlates with deteriorating financial health, creating a loop that negatively impacts financial well-being. Financial stress is especially acute for the low-income demographic and can lead to absolute poverty. Research in Malaysia demonstrates that financial stress adversely impacts financial well-being (Magli et al., 2021). Delafrooz et al. (2011) and Mansor et al. (2022) identify various indicators of financial well-being, such as meeting monthly expenses, financial happiness, creditworthiness, availability of emergency funds, distribution of credit card and loan payments, savings allocation, and retirement preparedness.

Previous research has demonstrated that one's monthly income and level of education are influential factors in determining one's overall well-being and financial behaviour. According to Shusha (2016), individuals with greater educational attainment and more income demonstrate improved financial conduct and a heightened sense of financial well-being. Previous studies have primarily examined the financial elements of vulnerable segments of society, specifically low-income households (Magli et al., 2021; Hung, 2020; Loibl, 2017). However, there is a limited amount of research that focuses on a specific subset of the vulnerable population, namely, young adults from low-income households. The literature highlights significant gaps in financial knowledge, the pervasive impact of financial stress, and the socioeconomic challenges low-income groups face. These factors collectively hinder retirement preparedness, underscoring the importance of targeted interventions.

Goyal et al. (2021) propose in their systematic literature review that individuals' financial behaviour, referred to in their study as 'personal financial management behaviour,' is influenced by specific factors. These factors include socio-demographic characteristics like education, job status, income, and psychological factors such as financial knowledge, locus of control, and financial attitudes. Yao et al. (2003) found that those with a low income renting their homes tended not to save money and lacked information about investing, making them the most vulnerable to inadequate retirement preparedness. Power and Hira (2004) found that professional or higher-ranking officers with a higher income are more inclined to have initiated retirement planning in contrast to lower-ranking staff members with lower compensation. This finding provides additional support for the statement above. In summary, the pervasive impact of financial stress and the socioeconomic challenges low-income groups face collectively hinder retirement preparedness, emphasizing the significance of targeted interventions.

Classification of Income Groups in Malaysia

The Malaysian population is categorized into three different income categories: the B40 group, which comprises the bottom 40% of income earners and is also known as the low-income group; the M40 group, representing the middle 40% of income earners; and the T20 group, comprising the top 20% of income earners or the high-income group. The stated average incomes for these groups are RM3,401, RM7,971, and RM19,652, respectively. The pandemic that in 2019 intensified income disparities in Malaysia, leading to approximately 20% of M40 households with earnings between RM5,250 and RM11,819 moving into the low-income category due to income declines (Yusoff et al., 2024). This demographic shift underscores the B40 group's increased prominence as the most significant income segment in Malaysia, justifying the selection of the B40 group for this study over other income brackets.

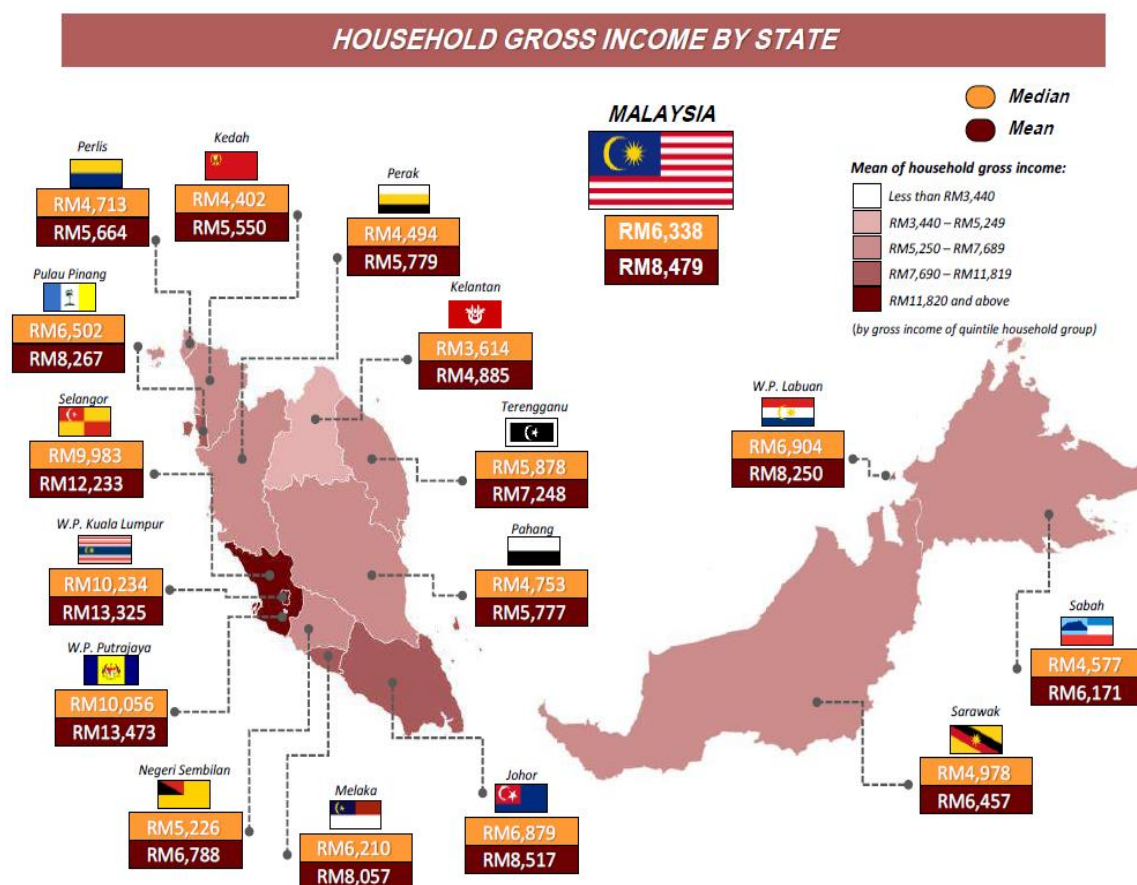


Fig. 1 Household Gross Mean and Median Income by State 2022.

The Department of Statistics Malaysia (2022) revealed substantial income disparities nationwide across Malaysia. Figure 1 and Table 1 illustrate the median and mean household gross incomes across various states in Malaysia. The national average median income is RM6,338, and the mean income is RM8,479 per year. With mean earnings of RM13,473, RM13,325, RM12,233, and RM8,517, respectively, Putrajaya, Kuala Lumpur, Selangor, and Johor are the most affluent states and the only four with mean incomes above the national average. Kelantan, Perlis, and Kedah, on the other hand, have the lowest mean incomes at RM4,885, RM5,664, and RM5,550, indicating a lower level of economic prosperity. This disparity highlights the varying economic conditions and living standards across the country, which are crucial for informing economic support strategies and regional development.

TABLE I INCOME STRUCTURE BY HOUSEHOLD GROUP, MALAYSIA, 2019 AND 2022.

Income Group	2019		2022	
	Households	Income	Households	Income
T20	1.46 million	Median: RM15,031 Mean: RM18,506	1.58 million	Median: RM15,867 Mean: RM19,652
M40	2.91 million	Median: RM7,093 Mean: RM7,348	3.16 million	Median: RM7,694 Mean: RM7,971
B40	2.91 million	Median: RM3,166 Mean: RM3,152	3.16 million	Median: RM3,440 Mean: RM3,401

Between 2019 and 2022, all three income groups in Malaysia, namely T20, M40, and B40, experienced modest increases in household income. The primary focus of this study is the B40 group, whose average income slightly increased from RM3,152 to RM3,401 between 2019 and 2022. Furthermore, the group's share of national income increased marginally from 16.0% to 16.1%. However, despite the slight gains, the B40 group

still continues to lag behind the T20 and M40 income groups in terms of income growth. This slower pace of improvement highlights the low-income group's ongoing financial challenges, emphasizing the importance of addressing the gaps in retirement savings and improving overall retirement preparedness (Department of Statistics Malaysia, 2022).

Prospect Theory

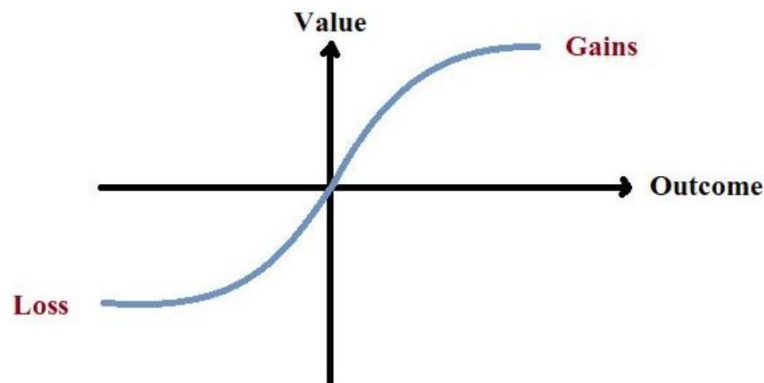


Fig. 2 Prospect Theory (Kahneman and Tversky, 1979)

Some of the elements that influence risk tolerance are trust, optimism, cognitive reflection, and situational threats (Owusu et al., 2023). Prospect theory states that when faced with financial uncertainty, people frequently show a high degree of loss aversion. These psychological biases will eventually influence financial decisions about retirement, especially investment behaviour (Yoo et al., 2023). When people are loss-averse, they tend to make the safest investment, which gives the lowest return, or do not invest at all because they have anxiety that they might lose their money. Furthermore, Agnew et al. (2012) emphasise that retirement investments are greatly influenced by risk preferences, which are shaped by personal experiences with gain and loss. Therefore, financial literacy is crucial in low-income groups in order to enhance individuals' risk tolerance and enable them to make more informed decisions on high-risk, high-reward possibilities.

Several past studies have used Prospect Theory to examine retirement planning behaviour in various contexts. For instance, Bateman et al. (2015) found that individuals are more distressed by losses and less satisfied with similar gains. Therefore, this will eventually discourage them from investing in riskier retirement products that could provide them with greater future savings. Runnloh and Ndirang (2018) used Prospect Theory to examine how individuals make choices post-retirement between saving the money that they have saved or spending the money after they stop working. This is crucial as the retiree does not have income streaming in after retirement. The study found that individuals have the desire to maintain their current lifestyle before retirement, but at the same time, they are struggling to balance saving enough to ensure financial security in their old age. In addition, a study by Kumaguru and Geetha (2021) also used prospect theory to investigate how risk perceptions can affect Generation Y retirement planning. The finding of this study shows that this group tends to delay or choose low-risk investment options due to their characteristics as loss-averse individuals.

Many members of this low-income group are risk-averse and prefer low-risk financial products over investments with higher returns. This financial behaviour eventually hinders them from investing and growing their money, which eventually leads to insufficient retirement savings. Therefore, this study employs Prospect Theory to examine the link between low-income private sector workers' risk tolerance and retirement preparedness, emphasizing how fear of loss shapes their long-term financial planning.

Risk Tolerance

Dohmen et al. (2011) define risk tolerance as the way individuals weigh potential gains against the risk connected with a particular financial decision. Essentially, it is about choosing between taking a chance to get

higher gains or playing it safe and just being in a comfortable position as they are now, but without significant gains. The term “risk tolerance” is also an important concept when experts want to develop financial and investment strategies. In an instance, the risk-averse individual has a very different investment and financial path than the risk-taker individual, which will lead to a vastly different return in the long run. Larson et al. (2016) stated that individuals with higher financial literacy tend to have better risk tolerance, which shapes how they plan financially for retirement. Similarly, Kusairi et al. (2019) further highlight that risk tolerance reflects whether an individual is willing to take a chance for a bigger return or prefers to safeguard their current assets. For instance, someone with extra savings might choose to either invest in a high-risk stock for a maximum potential gain or opt for a secure savings account that offers modest but steady returns.

Risk tolerance has been associated with increased knowledge of a particular individual. This means that the higher the person’s financial knowledge, the higher the risk tolerance of that particular person. Duckworth et al. (2007) state that higher levels of education affect a person's risk tolerance in a good way. They can recognize and evaluate various kinds of risks as compared to those with lower levels of academic performance, who mostly do not have much information regarding the risks. The combination of reliability of interest and persistence of determination can explain the differences in accomplishment results well. According to Van Rooij et al. (2011), financial literacy increases a person's ability to understand information in light of the financial tools they use, therefore enabling them to assess risks. Earlier studies linking financial literacy and academic performance with wealth accumulation and organising behaviour supported this (Wahyuni et al., 2021; Lusardi & Mitchell, 2007; Chatterjee & Zahirovic-Herbert, 2010). Financial literacy also acts as a mediator between knowledge and risk tolerance (Grable, 2008).

A previous study by Harahap et al. (2022) and Hermansson and Jonsson (2021) stated that an individual with higher financial literacy is linked with higher risk tolerance. Additionally, a person's financial risk tolerance can forecast their intention to save money to create financial buffers, such as the requirement for investments for future needs, emergency reserves, and pension funds. Individuals with high-risk tolerance are inclined to engage in high-risk investment activities, such as investing in stocks. According to Hariharan et al. (2000) and Jacobs-Lawson and Hershey (2005), individuals who exhibit risk aversion tend to allocate their funds toward savings accounts that offer reliable financial strategies. Individuals can make an informed decision about stock savings by solidly understanding their financial risk tolerance (Yao & Curl, 2011). Individuals' financial numeracy and financial management skills impact their impression of risk tolerance (Sages & Grable, 2010).

Parker, Williams, and Turner (2006) define proactive risk-taking behaviour as actions that are self-initiated and future-oriented, with the intention of altering or enhancing circumstances. According to Balaz (2020), a general risk trait also encompasses a propensity to invest in risky financial assets, such as stocks or stock funds. Consumer financial decisions are influenced by risk-taking behaviour, which is a critical element of financial planning and has a positive impact on retirement preparation (Grable & Rabbani, 2014). Previous research (Dulebohn & Murray, 2008) stated that investment was positively correlated with risk-taking behaviour, which in turn influenced retirement savings. According to Faff et al. (2008), financial risk tolerance (FRT) combines interest and ability to manage financial hazards. Financial knowledge, psychological qualities, time perspective, financial sources, and risk mitigation capacity should be considered to estimate FRT accurately. Additionally, financial risk tolerance is linked to educational success, earnings, and wealth (Hallahan et al., 2004).

Watson and McNaughton (2007) examined how gender affects risk choices in retirement investing while studying risk tolerance. Evidence suggests that women have a tendency to choose investment methods that are more cautious in nature compared to those favored by males. Speelman, Clark-Murphy, and Gerrans (2007) made a similar discovery, finding that, with a few significant exceptions, females tend to be more risk-averse than males. By precisely adjusting for investors' self-perceived willingness to assume financial risk, Badunenko et al. (2009) investigate disparities between genders. The results partially confirm the gender stereotype. The likelihood of women owning risky financial assets was shown to be lower. However, when it comes to ownership, women give these assets an equal or even more significant portion of their wealth than

men. The authors argue that attitudes towards financial risks, particularly among women, may not accurately represent their willingness to take them. Consequently, the subsequent hypothesis is posited:

H1: Risk tolerance is positively associated with the retirement preparedness of Malaysian low-income private sector employees.

Financial Knowledge and Retirement Preparedness

Individuals with more financial knowledge are more concerned and better prepared for old age as compared to those who have less financial knowledge. They are more knowledgeable about pension schemes, including their regulations and methods, pay lesser costs for retirement account management, and diversify their investment portfolios more effectively (Lusardi and Mitchell, 2014; Behrman et al., 2012). Edmiston and Gillett-Fisher (2006) identified two primary themes about financial knowledge: (i) the positive impact of financial education on both financial knowledge and behaviour, and (ii) the positive correlation between good financial behaviour and higher levels of financial knowledge. An individual's ability to engage in sound financial practices is contingent upon acquiring relevant knowledge.

According to She et al. (2022), it is necessary to enhance financial knowledge and cultivate appropriate financial behavior, which are crucial for adequate retirement preparation among working individuals. Individuals with a greater level of financial knowledge and good financial behaviours are responsible for their credit card usage, timely bill payments, adhering to a budget, managing financial matters, and making more informed decisions regarding financial matters, in contrast to those with limited financial knowledge (Hamid & Loke, 2021). Nevertheless, it is evident that the majority of employed adults or individuals approaching retirement age have a weak understanding of finance and fail to handle their financial matters effectively. Consequently, this results in diminished quality of life during the post-retirement phase for retirees (Butt et al., 2018). This will result in financial strain for retirees who experienced a higher standard of life during their working years (Lusardi & Mitchell, 2017).

Previous research has suggested that the terms "financial literacy" and "financial knowledge" are frequently considered interchangeable (Lusardi & Mitchell, 2014; Huang et al., 2013). According to Huston (2010), literature and popular media use financial knowledge and financial literacy as synonymous. The knowledge gained through formal education or experience in personal finance also interchangeably uses both financial knowledge and financial literacy. A financially literate person is able to apply and understand basic knowledge of financial concepts (Garg & Singh, 2018). Financial literacy has been found to have a positive relationship with retirement preparedness and confidence, which in turn leads to the accumulation of savings for one's retirement years (Lusardi & Mitchell, 2007; 2014). Subsequently, the following hypothesis is posited:

H2: Financial knowledge is positively associated with the retirement preparedness of Malaysian low-income private sector employees.

Financial Knowledge as a Mediator

Financial knowledge refers to an individual's comprehension of financial concepts. It is commonly used as an alternative for financial literacy (Huang, Nam, & Sherraden, 2013). It acts as a sign of competency and skills to navigate financial matters such as budgeting, saving, or investing confidently. According to Lusardi & Mitchell (2014), when individuals have strong financial knowledge, they can make choices that positively affect their financial well-being. In contrast, lacking this knowledge can lead to financial difficulties, such as high debt levels, poor retirement planning, and paying excessive fees for financial services. Research shows that financially knowledgeable individuals are more likely to plan, make proactive financial decisions, and wisely choose financial products (Zhu & Chou, 2018; Ricci & Caratelli, 2017; Bucher-Koenen & Lusardi, 2011). Carpena et al. (2011) emphasize that good financial knowledge helps people select the most suitable savings and investment options while avoiding unwise financial choices.

According to Lusardi & Mitchell (2007), financial knowledge enhances retirement planning and money management prior to reaching retirement age in the United States. In addition, Hasler and Lusardi (2017) also discovered that there is a robust relationship between financial knowledge and retirement savings in the economies of the Group of Twenty (G20) nations. This was further supported by Bernheim and Garrett (2003), who found that there is a direct correlation between engagement and participation in financial literacy programs, which can lead to high retirement preparedness. However, Bandura (1998) and Ajzen (1991) argue that having financial knowledge is not enough, as self-efficacy is also essential. Believing in one's ability to carry out financial strategies effectively is crucial for implementing successful retirement financial plans. This highlights the relationship between knowledge, self-efficacy, and financial planning behaviour, which eventually leads to retirement preparedness.

Financial literacy plays a key role in helping individuals make better financial decisions. Cohen and Nelson (2011) highlight that understanding basic financial concepts and building essential financial skills are crucial for effective financial planning, especially for low-income households. However, many in developing economies still face financial exclusion due to a lack of financial literacy (Agarwal, 2007; Cole et al., 2011). To address this, targeted financial education programs are needed. Holzmann (2010) found that such initiatives can significantly improve financial outcomes and promote smarter saving habits among low-income families. Additionally, equipping individuals with financial skills helps them make better use of financial products and reduces information gaps (Ardic et al., 2011). Financial literacy also supports better resource allocation, informed decision-making, and financial resilience (Lusardi & Mitchell, 2014). Educating individuals about financial concepts can positively influence financial behaviors, such as saving and planning for retirement (Jappelli, 2010). Studies by Lin et al. (2017) and Lusardi and Mitchell (2017) confirm that early financial education correlates with improved retirement preparedness.

As a mediator, financial knowledge bridges the gap between financial attitudes, experiences, and actual behaviors. It enables individuals to convert intentions into practical financial outcomes, thereby boosting confidence and decision-making abilities (Guntur & Soares, 2022; Ricci & Caratelli, 2017). Sekita (2011) found that individuals with better financial knowledge are more likely to make informed financial choices. This role becomes even more critical during the period of economic uncertainty. For instance, during the COVID-19 pandemic, financial knowledge was found to significantly help individuals with the skills to manage resources more effectively (Anand et al., 2021). Similarly, Chen, Lu, and Wang (2022) noted that financial knowledge transforms informal financial learning into practical skills. This will reflect in the individuals day to day financial management.

Focusing on retirement, Chen and Cao (2022) revealed that financial knowledge mediates the link between informal financial education and retirement planning behaviour, such as regular saving. Shih et al. (2022), using the Theory of Planned Behavior, showed that financial knowledge strengthens the connection between positive attitudes and financial behaviour, including retirement planning. Nchise and Akosso (2024) found that financial literacy increased the use of both formal and informal financial services, which in turn improved retirement preparedness. These studies consistently support the role of financial knowledge as a mediator in enhancing retirement planning. Therefore, examining its impact on Malaysia's low-income population is both relevant and timely. Insights from this research can guide targeted interventions to improve financial preparedness for retirement. Consequently, the subsequent hypothesis is posited:

H3: Financial knowledge mediates the relationship between risk tolerance and retirement preparedness among Malaysian low-income private sector employees.

This paper makes several theoretical contributions. Firstly, it applies Prospect Theory to the context of low-income (B40) workers in Malaysia, a group that has received limited attention in behavioural finance and retirement studies. This demonstrates the relevance of Prospect Theory in explaining retirement planning behaviour in emerging economies. Secondly, it introduces financial knowledge as a mediating factor that reduces the effects of loss aversion and risk aversion on retirement preparedness. The study integrates behavioral biases and financial capabilities, providing a more complete picture of retirement decision-making.

Lastly, it adds to the broader literature on retirement preparedness by proposing a framework that integrates risk tolerance, financial knowledge, and retirement preparedness. Thus, it lays the groundwork for future empirical testing and policy development.

CONCEPTUAL FRAMEWORK & HYPOTHESES OF THE STUDY

Figure 2 illustrates a conceptual framework for investigating retirement preparedness among Malaysian low-income (B40) private sector workers. Based on Prospect Theory, this framework investigates how people's retirement preparedness is affected by their risk tolerance, with financial knowledge acting as a mediating factor. The purpose of the study is to explore the relationship between risk tolerance and retirement preparedness and the influence of financial knowledge in this relationship.

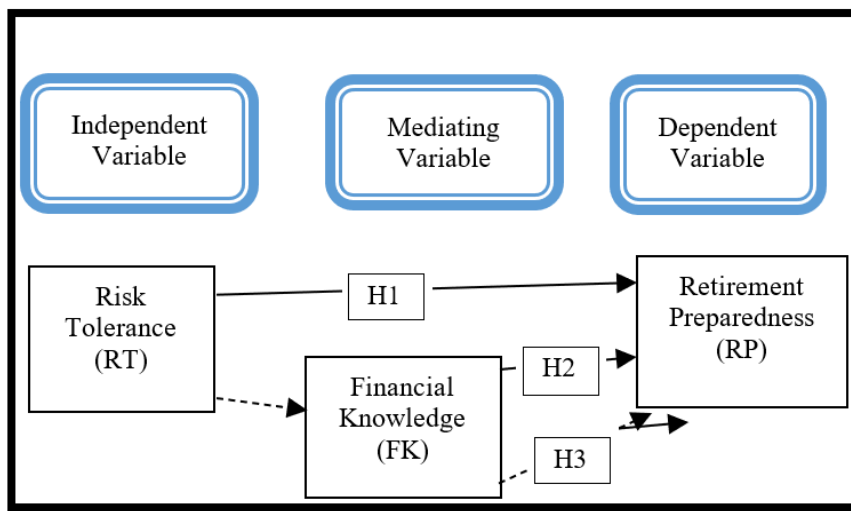


Fig. 3 Conceptual Framework

POTENTIAL OUTCOME AND DIRECTION FOR FUTURE RESEARCH

This conceptual study examines the influence of risk tolerance as the independent variable and financial knowledge as a mediating factor on retirement preparedness among low-income private-sector employees in Malaysia. The target population consists of individuals aged 18 to 50, as this group represents the most economically active segment of the workforce in Malaysia, who are in the phase of accumulating wealth for retirement. These age groups consist of individuals who are either entering the labour market after reaching the age of majority, actively employed in the workforce, and also those approaching mid-career who are still in the phase of financial accumulation to plan for retirement. All of the above make them critical to study in terms of developing long-term financial behaviours and allow for more relevant assessment of risk tolerance and financial knowledge as they pertain to retirement preparedness. Individuals from the above age group were chosen as they still have time to take corrective action based on targeted financial literacy interventions. On the other hand, the target population of this study was the low-income group with household incomes of RM5,250 or below. This group was selected because it is the primary income group in Malaysia, which represents almost half of the population, and because of its heightened vulnerability to financial insecurity in old age. They often have limited access to formal financial education and a lower savings threshold, which thereby reduces their participation in retirement planning activities. These constraints make them more vulnerable to the negative consequences of poor financial management under conditions of high uncertainty. By focusing on the low-income group, the study aims to address a critical gap in the literature on retirement planning and behavioral finance. This could inform targeted policy interventions and financial literacy programs to improve retirement outcomes of these vulnerable populations.

Future empirical research will advance this conceptual framework by employing an exploratory research design. This will be done by integrating quantitative methods to collect primary data from the respondents.

Data will be gathered using a standardized 5-point Likert scale questionnaire, run either in person or via an online tool like Google Forms. This study will concentrate on individuals coming from a low-income group living in four regions across Peninsular Malaysia, which include the Central, Northern, Southern, and East Coast regions. The central region is made up of Selangor, Kuala Lumpur, Putrajaya, and Negeri Sembilan; the northern region is made up of Perlis, Kedah, Penang, and Perak; the southern region is made up of Melaka and Johor; and the East Coast region is made up of Kelantan, Terengganu, and Pahang. East Malaysia, which encompasses Sabah, Sarawak, and Labuan, would be excluded from the study. This is due to logistical limitations and accessibility issues with the data collection.

Retirement preparedness will be measured using twelve items, which include three items adapted from Ratneswary et al. (2020), which focus on responsibility, awareness, and understanding of financial planning. Another nine items were questions related to income planning, financial goal-setting, and confidence in meeting essential, medical, and long-term expenses during retirement, which were adapted from Guptan et al. (2021). On the other hand, risk tolerance will be measured using eight items adapted from Harahap et al. (2022) and Tomar, Baker, Kumar, and Hoffmann (2021). These items assess individuals' willingness to accept financial risk in retirement planning, such as readiness to bear investment risks, preference for safe or risky investments, and persistence in investing despite potential losses. Financial knowledge will be assessed using eight items, four of which were adapted from Jacobs-Lawson and Hershey (2005). These items assess general knowledge of retirement planning, awareness of Employee Provident Fund (EPF) and Private Retirement Schemes (PRS) schemes, and confidence in financial planning ability. Another four items were adapted from Shanmugam and Zainal Abidin (2013), which include inflation, investment options, and compound interest. These items cover both applied and conceptual aspects of financial literacy that are important to retirement.

A cross-sectional design will be employed for data collection in this study. Data will be collected at a single point in time from four different regions across Peninsular Malaysia. All the data gathered will eventually be analysed in two steps. For the first step, IBM SPSS Statistics Version 29 will be used to perform data cleansing. It will also be used to check on the reliability of the data and perform descriptive analysis. For the second step, SmartPLS Version 4.0, Partial Least Squares Structural Equation Modelling (PLS-SEM) will be employed. This phase will focus on assessing the measurement and structural models. Furthermore, it will also be used to test the hypotheses in order to uncover relationships among variables. Therefore, this step facilitates the identification of significant predictors, which will eventually offer valuable insights into retirement planning behaviour. This framework can be further enhanced in future research by integrating Prospect Theory with the Theory of Planned Behaviour (TPB). TPB can bring robustness to the current framework by clarifying the psychological and behavioural factors influencing retirement preparedness.

PRACTICAL IMPLICATIONS

The proposed conceptual framework offers numerous practical contributions. Policymakers can utilize it to create tailored financial literacy programs for B40 workers, which can embed behavioural interventions that address risk aversion and loss avoidance. Financial institutions and retirement-related organizations can utilize the model to design products and advisory services that improve financial preparedness. Educators and employers can incorporate retirement preparedness courses into workplace training, particularly for industries with substantial B40 workforces. These consequences ensure that the framework is both theoretically valuable and applicable in the real world. As this paper is conceptual, the proposed model requires empirical testing. Future research can validate the framework by conducting quantitative surveys with B40 private-sector workers using SPSS and SmartPLS. This will strengthen both the theoretical and practical contributions of the study.

CONCLUSION

This study presents a framework for analysing the relationship between risk tolerance as an independent variable and retirement preparedness as a dependent variable. In addition, financial knowledge was added in the theoretical framework of this study, serving as a mediating variable. The objective of this study is to

understand how financially vulnerable individuals within the low-income demographic make financial decisions in uncertain conditions. In addition, this study also seeks to understand how financial knowledge may mitigate cognitive biases associated with risk. The proposed model provides a conceptual framework grounded in prospect theory with risk tolerance and financial knowledge as variables in order to explain retirement preparedness. Nonetheless, empirical validation is required to test the applicability and robustness of the proposed framework and variables across various settings. Therefore, future research will empirically validate the hypothesised relationships between the variables using a quantitative approach where data can be collected physically or online.

Next, all the data that has been collected can be analysed using IBM SPSS Statistics and SmartPLS. This is important in order to test and validate the variables proposed in the conceptual framework. In the future, various theoretical frameworks, including the Theory of Planned Behaviour (TPB), can be integrated into the current proposed framework in order to increase the robustness of the current study. This can enhance the understanding of psychological and behavioural influences impact on retirement preparedness and offers a more in-depth study of the low-income group's preparation for retirement.

Furthermore, comparative studies examining various income level categories within low-income groups, as well as urban and rural populations, and considering demographic variables such as ethnicity, gender, and age, may provide a more comprehensive understanding of the subject. Ultimately, the findings of this study aim to make a significant contribution to the existing literature on retirement planning and behavioural finance. This study aims to provide insightful guidance to financial planners, businesses, and legislators by identifying key elements that affect retirement preparedness among vulnerable groups, which represent more than half of the population in Malaysia. With the issues of increasing life expectancy and an aging population, this topic is crucial in order to draw a proper retirement plan targeted especially at the low-income groups. Thus, improving financial education and encouraging more financial inclusion for a low-income group can help to lower poverty and improve the long-term financial security of Malaysia's low-income workers.

Overall, this conceptual study contributes to theory by extending Prospect Theory to an understudied population and emphasizing the mediating role of financial knowledge. It offers practical suggestions to policymakers, financial institutions, employers, and educators in addressing retirement insecurity among B40 workers. While empirical validation is still required, the paper establishes a strong foundation for future research and policy initiatives aimed at enhancing retirement preparedness.

ACKNOWLEDGMENT

Non-funded

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

1. Abdullah, N. I. (2021). Impactful and collective microtakaful in addressing the impact of COVID-19 pandemic. *Journal of Islamic Finance*, 10, 117–126.
2. Agarwal, R. (2007). 100% financial inclusion: A challenging task ahead. Paper presented at the Conference on Global Competitiveness of Indian Corporate.
3. Agnew, J. R., Bateman, H., & Thorp, S. (2012). Financial literacy and retirement planning in Australia. *Journal of Pension Economics & Finance*, 12(3), 1–20. <https://doi.org/10.1017/S1474747212000033>
4. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
5. Andonov, A., Bauer, R., & Cremers, M. (2017). Pension fund asset allocation and liability discount rates. *Review of Financial Studies*, 30(8), 2555–2595. <https://doi.org/10.1093/rfs/hhx008>

6. Anand, P., et al. (2021). Financial literacy and COVID-19: Coping with economic shocks. *Journal of Financial Education*, 47(3), 85–97. <https://doi.org/10.2139/ssrn.3629136>
7. Ardic, O., et al. (2011). Access to financial services and the financial inclusion gap. *World Bank Policy Research Working Paper*, 5617. <https://doi.org/10.1596/1813-9450-5617>
8. Badunenko, O., et al. (2009). Financial risk tolerance and investment behavior. *Journal of Risk Research*, 12(4), 415–429. <https://doi.org/10.1080/13669870902752348>
9. Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13(4), 623–649. <https://doi.org/10.1080/08870449808407422>
10. Bank Negara Malaysia. (2021). Annual Report 2021. https://www.bnm.gov.my/documents/20124/6458991/ar2021_en_book.pdf
11. Bank Negara Malaysia. (2022). Annual Report 2022. <https://www.bnm.gov.my/ar2022>
12. Bateman, H., et al. (2015). Risk preferences and retirement savings decisions. *Journal of Pension Economics and Finance*, 14(3), 213–239. <https://doi.org/10.1017/S1474747214000394>
13. Baron, L. M. (2015). Financial literacy with families: Opportunity and hope. *Journal of Urban Mathematics Education*, 8(2), 31–39. <https://files.eric.ed.gov/fulltext/EJ1085813.pdf>
14. Behrman, J. R., et al. (2012). Financial literacy and economic outcomes. *American Economic Review*, 102(3), 300–304. <https://doi.org/10.1257/aer.102.3.300>
15. Bernama. (2023, February 23). EPF clarifies investment income and 2023 dividend payout. <https://www.bernama.com/en/news.php?id=2395402>
16. Bernheim, B. D., & Garrett, D. M. (2003). The effects of financial education in the workplace: Evidence from a survey of households. *Journal of Public Economics*, 87(7–8), 1487–1519. [https://doi.org/10.1016/S0047-2727\(01\)00184-0](https://doi.org/10.1016/S0047-2727(01)00184-0)
17. Bianchi, M. (2018). Financial literacy and investment behavior among low-income households. *Journal of Economic Behavior & Organization*, 155, 106–120. <https://doi.org/10.1016/j.jebo.2018.07.008>
18. Brown, M., et al. (2011). Financial literacy and retirement planning. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
19. Bucher-Koenen, T., & Lusardi, A. (2011). Financial literacy and retirement preparedness among the elderly. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
20. Butt, A., et al. (2018). Financial literacy and financial stress among retirees. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
21. Carpena, F., et al. (2011). Financial literacy and risk management. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
22. Chatterjee, S., & Zahirovic-Herbert, V. (2010). The role of financial literacy in retirement savings. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
23. Chen, L., Lu, C., & Wang, Y. (2022). The impact of financial knowledge on retirement planning. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
24. Chen, Y., & Cao, L. (2022). Financial literacy and its impact on financial behavior: Evidence from China. *Journal of Financial Research*, 45(3), 78–90.
25. Chek, M. F., & Ismail, S. (2023). Financial literacy and retirement planning in Malaysia: Issues and challenges. *Journal of Economics and Finance*, 14(1), 23–35.
26. Cohen, M., & Nelson, C. (2011). Financial literacy: A step for clients towards financial inclusion. *Enterprise Development and Microfinance*, 22(3), 194–202.
27. Cole, S., et al. (2011). Financial literacy and its role in economic development. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
28. Delafrooz, N., & Paim, L. (2011). Determinants of saving behavior and financial problem among employees in Malaysia. *African Journal of Business Management*, 5(24), 10092–10100. <https://ajbasweb.com/old/ajbas/2011/July-2011/222-228.pdf>
29. Department of Statistics Malaysia. (2022). Salaries and Wages Survey Report 2022. <https://www.dosm.gov.my/portal-main/release-content/salaries-and-wages-survey-report-2022>
30. Department of Statistics Malaysia. (2023). Salaries and Wages Survey Report 2023. <https://www.dosm.gov.my/portal-main/release-content/salaries-and-wages-survey-report-2023>

31. Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9(3), 522–550. <https://doi.org/10.1111/j.1542-4774.2011.01015.x>
32. Dulebohn, J. H., & Murray, B. (2008). Financial risk tolerance and investment behavior. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
33. Duckworth, A. L., et al. (2007). Education and risk tolerance: A study of financial decision-making. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
34. Edmiston, K., & Gillett-Fisher, M. (2006). The impact of financial literacy on personal finance management. *Risk Tolerance and Financial Knowledge in Retirement Preparedness*.
35. Employees Provident Fund. (2023). Annual Report 2023. <https://www.kwsp.gov.my/en/corporate/news-highlights/publications>
36. Employees Provident Fund. (2024). Annual Report 2024. <https://www.kwsp.gov.my/en/corporate/news-highlights/publications>
37. Faff, R., et al. (2008). Financial risk tolerance: An empirical analysis. *Journal of Financial Research*, 31(1), 1–23. <https://doi.org/10.1111/j.1475-6803.2008.00238.x>
38. Garg, N., & Singh, S. (2018). Financial literacy among youth. *International Journal of Social Economics*, 45(1), 173–186. <https://doi.org/10.1108/IJSE-11-2016-0303>
39. Goyal, A., et al. (2021). Financial distress and COVID-19: Evidence from working individuals. *Qualitative Research in Financial Markets*, 13(4), 503–528. <https://doi.org/10.1108/QRFM-08-2020-0159>
40. Grable, J. (2008). Risk tolerance. In J. J. Xiao (Ed.), *Handbook of Consumer Finance Research* (pp. 3–19). New York, NY: Springer.
41. Grable, J. E., & Rabbani, A. (2014). Risk tolerance across life domains: Evidence from a sample of older adults. *Journal of Financial Counseling and Planning*, 25(2), 174–183. https://www.researchgate.net/publication/270286601_Risk_Tolerance_Across_Life_Domains_Evidence_from_A_Sample_of_Older_Adults
42. Gryphon, D., Lee, J., & Croy, G. (2012). Psychological determinants of retirement savings behavior: An application of the theory of planned behavior. *Journal of Financial Planning*.
43. Guntur, M., & Soares, L. (2022). Financial knowledge as a mediator in retirement planning. *Journal of Financial Studies*, 12(3), 134–148. <https://doi.org/10.1016/j.jfs.2022.01.004>
44. Gupta, V., Rasiah, R., Singh, H. K. P., Turner, J. J., Kumar, S., & Sorooshian, S. (2021). Retirement preparedness and subjective well-being: Evidence from Malaysia. *Quality - Access to Success*, 22(185), 200–210. <https://doi.org/10.47750/QAS/22.185.27>
45. Hallahan, T. A., et al. (2004). An empirical investigation of personal financial risk tolerance. *Financial Services Review*, 13, 57–78.
46. Hamid, M. A., & Loke, Y. J. (2021). Financial literacy and retirement confidence among Malaysian workers. *International Journal of Business and Economics*, 8(2), 123–135.
47. Harahap, S., Thoyib, A., Sumiati, S., & Djazuli, A. (2022). The impact of financial literacy on retirement planning with serial mediation of financial risk tolerance and saving behavior: Evidence of medium entrepreneurs in Indonesia. *International Journal of Financial Studies*, 10(3), 66. <https://doi.org/10.3390/ijfs10030066>
48. Hariharan, G., Chapman, K. S., & Domian, D. L. (2000). Risk tolerance and asset allocation for investors nearing retirement. *Financial Services Review*, 9(2), 159–170.
49. Hasler, A., & Lusardi, A. (2017). The gender gap in financial literacy: A global perspective. *Global Financial Literacy Excellence Center, The George Washington University*.
50. Hermansson, C., & Jonsson, S. (2021). Financial literacy and financial risk tolerance among young adults. *Journal of Behavioral and Experimental Finance*, 29, 100450. <https://doi.org/10.1016/j.jbef.2021.100450>
51. Holzmann, R. (2010). Bringing financial literacy and education to low and middle-income countries. *World Bank Working Paper*. <https://doi.org/10.1596/1813-9450-5617>
52. Hung, A. (2020). Financial literacy and its impact on retirement planning. *OECD Working Papers on Finance*.

53. Huston, S. J. (2010). Measuring financial literacy. *Journal of Consumer Affairs*, 44(2), 296–316. <https://doi.org/10.1111/j.1745-6606.2010.01170.x>
54. Idris, F., et al. (2013). Financial literacy and financial stress among youth in Malaysia. *Malaysian Journal of Consumer and Family Economics*, 20(2), 123–136.
55. Jacobs-Lawson, J. M., & Hershey, D. A. (2005). Influence of future time perspective on retirement savings behavior. *Financial Services Review*, 14, 331–344.
56. Jappelli, T. (2010). Economic literacy: An international comparison. *The Economic Journal*, 120(548), 429–451. <https://doi.org/10.1111/j.1468-0297.2010.02397.x>
57. Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291. <https://doi.org/10.2307/1914185>
58. Kimiyaghalam, H., & Yap, S. F. (2017). Level of financial literacy in Malaysia. *International Journal of Social Economics*, 44(9), 1234–1247. <https://doi.org/10.1108/IJSE-11-2016-0303>
59. Kimiyaghalam, F., Safari, M., & Mansori, S. (2019). Influential behavioral factors on retirement planning behavior: The case of Malaysia. *International Journal of Business and Society*, 20(1), 1–18.
60. Kumaguru, S., & Geetha, C. (2021). Financial literacy and its impact on investment decisions: A study among Malaysian working adults. *Journal of Economics and Finance*, 12(3), 45–55.
61. Kusairi, S., et al. (2019). Financial literacy and retirement savings behavior. *Journal of Economic Studies*, 28(3), 157–169.
62. Larson, C. R., et al. (2016). Financial knowledge and investment decisions among millennials. *Journal of Financial Planning*, 29(1), 45–60.
63. Lin, F., et al. (2017). Financial literacy, financial advisors, and life insurance demand. *Pacific-Basin Finance Journal*, 43, 218–237. <https://doi.org/10.1016/j.pacfin.2017.03.004>
64. Loibl, C. (2017). The impact of financial education on retirement savings. *Journal of Pension Economics and Finance*, 10(4), 547–564.
65. Lusardi, A., & Mitchell, O. S. (2007a). Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business Economics*, 42(1), 35–44. <https://doi.org/10.2145/20070104>
66. Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5–44.
67. Lusardi, A., & Mitchell, O. S. (2017). Financial literacy and retirement planning: Evidence and implications. *Business Economics*, 42(1), 35–44.
68. Magli, G., et al. (2021). Financial well-being among B40 households in Selangor. *International Journal of Academic Research in Business and Social Sciences*, 11(3), 456–465.
69. Mansor, M., et al. (2022). Financial literacy and financial planning among Malaysians. *Journal of Economics and Finance*, 15(2), 78–89.
70. Nchise, A., & Akosso, A. (2024). Financial literacy and economic empowerment in sub-Saharan Africa. *Journal of African Economics*, 33(1), 89–105.
71. Organisation for Economic Co-operation and Development (OECD). (2013). Pensions at a glance 2013: OECD and G20 indicators. <https://doi.org/10.1787/19991363>
72. Owusu, G. A., Boakye, K., & Mensah, J. K. (2023). Financial literacy and its impact on savings behavior among Ghanaian youth. *African Journal of Economic Policy*, 30(2), 112–125.
73. Parker, S. K., et al. (2006). Modelling proactive behavior at work. *Journal of Applied Psychology*, 91(3), 636–652.
74. Potrich, A. C. G., et al. (2016). Development of a financial literacy model for university students. *Management Research Review*, 39(3), 356–376.
75. Rahman, M. A. (2020). Financial literacy and its impact on savings behavior: A study on Malaysian consumers. *International Journal of Business and Management*, 15(6), 1–10.
76. Rapi, M., et al. (2022). Financial literacy and saving behavior among low-income groups. *Journal of Economic and Administrative Sciences*, 34(2), 127–143.
77. Ricci, O., & Caratelli, M. (2017). Financial literacy, trust and retirement planning. *Journal of Pension Economics and Finance*, 16(1), 43–64.

78. Runnloh, G., & Ndirang, P. (2018). Financial literacy and investment behavior: Evidence from developing economies. *International Journal of Financial Studies*, 6(2), 121–134.
79. Sages, R. A., & Grable, J. E. (2010). Financial literacy and financial management behavior. *Journal of Financial Counseling and Planning*, 21(1), 15–24.
80. Sekita, S. (2011). Financial literacy and retirement planning in Japan. *Journal of Pension Economics & Finance*, 10(4), 637–656. <https://doi.org/10.1017/S1474747211000539>
81. Shanmugam, A., & Zainal Abidin, F. (2013). Retirement confidence and preparedness: A study among working adults in a northern state in Malaysia. Paper presented at the Conference on Business Management Research 2013, December 11, 2013, EDC, Universiti Utara Malaysia, Sintok. Retrieved from <https://repo.uum.edu.my/id/eprint/16366>
82. She, H., Lee, C., & Tan, M. (2022). Financial literacy and savings behavior among Malaysian youth. *Asian Journal of Economics and Finance*, 4(2), 1–10.
83. She, H., Lee, C., & Tan, M. (2023). The role of financial literacy in retirement planning: Evidence from Malaysia. *Asian Journal of Economics and Finance*, 5(1), 50–65.
84. Shih, L., et al. (2022). Financial literacy, risk tolerance, and retirement preparedness among young adults. *Journal of Financial Planning*, 28(3), 45–62.
85. Shusha, A. A. (2016). The impact of financial literacy on the financial behavior of consumers in the United Arab Emirates. *International Journal of Business and Social Science*, 7(11), 1–10.
86. Siwar, C., et al. (2019). Financial inclusion and retirement security among lower-income groups. *International Journal of Economics and Financial Issues*, 9(4), 123–132.
87. Speelman, C. P., et al. (2007). Financial literacy and retirement planning: Insights from a behavioral perspective. *Journal of Behavioral Finance*, 8(1), 13–22.
88. Suprpto, B. (2020). The role of financial literacy in shaping retirement savings behavior. *Journal of Personal Finance*, 18(4), 112–125.
89. Tan, M., Carvalho, J., & Rahim, H. A. (2023). Financial literacy and investment behavior among Malaysian millennials. *International Journal of Business and Society*, 24(2), 112–125.
90. Teh, K. S., Tey, N. P., & Ng, S. T. (2014). Financial knowledge and retirement readiness among working adults. *Journal of Financial Services Marketing*, 20(2), 78–85.
91. Tomar, S., Kent Baker, H., Kumar, S., & Hoffmann, A. O. I. (2021). Psychological determinants of retirement financial planning behavior. *Journal of Business Research*, 133, 432–449. <https://doi.org/10.1016/j.jbusres.2021.05.007>
92. Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5(2), 207–232.
93. United Nations. (2024). UN Country Results Report Malaysia 2024: Consolidating SDG Progress and Enabling Malaysia's Development Transition. <https://malaysia.un.org/en/293682-un-country-results-report-malaysia-2024-consolidating-sdg-progress-and-enabling-malaysia%E2%80%99s>
94. Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*, 101(2), 449–472. <https://doi.org/10.1016/j.jfineco.2011.03.006>
95. Wahyuni, S., et al. (2021). Financial literacy and its impact on retirement planning among employees. *International Journal of Business and Management Studies*, 10(2), 51–65.
96. Watson, R., & McNaughton, M. (2007). Gender differences in financial literacy and retirement planning. *Journal of Consumer Affairs*, 41(2), 224–239.
97. World Bank. (2021). World Development Report 2021: Data for Better Lives. <https://www.worldbank.org/en/publication/wdr2021>
98. Yao, R., & Curl, A. (2011). Financial literacy and retirement savings behavior among baby boomers. *Journal of Family and Economic Issues*, 32(3), 532–544.
99. Yoo, S., et al. (2023). Financial literacy and risk tolerance in retirement planning: A comparative study. *Journal of Behavioral and Experimental Finance*, 41, 101116.
100. Yusoff, N. D., Ismail, S., Abd Razak, N., Rafien, N. S. M., & Yaakub, W. (2024). Retirement Preparedness among Malaysia's Low-Income Private Sector Employees: A Conceptual Model. *Information Management and Business Review*, 16(3(I)S), 613–627. [https://doi.org/10.22610/imbr.v16i3\(I\)S.4088](https://doi.org/10.22610/imbr.v16i3(I)S.4088)

101. Yusof, S. A. M., Sabri, M. F., & Rahim, H. A. (2018). Financial literacy and retirement planning among Malaysian working adults. *Malaysian Journal of Consumer and Family Economics*, 21, 1–15.
102. Zhu, N., & Chou, P. (2018). Retirement goal clarity and financial literacy: Evidence from China. *Journal of Pension Economics and Finance*, 17(1), 123–139.