

**Differences in Financial Risk Tolerance Across Income Groups: A Kruskal–Wallis Test Approach**

**Ankita Jangid**

Department-Management Studies  
University-Bharati Vidyapeeth (Deemed to be University) Department of Management Studies  
Mail id [ankita.jangid@bharatividyaeeeth.edu](mailto:ankita.jangid@bharatividyaeeeth.edu)

**Dr. Alka Sharma**

Department- Commerce & Management  
University/College- Tilak College, Vashi, Navi Mumbai  
Mail id - [alka.aan.sharma@gmail.com](mailto:alka.aan.sharma@gmail.com)

**Dr. Kholoud Bajunaid**

College of Business Administration, University of Business and Technology, Jeddah, Saudi Arabia  
Email: [k.bajunaid@ubt.edu.sa](mailto:k.bajunaid@ubt.edu.sa)

**Dr Afroze Nazneen**

Department of Business Administration, College of Business  
University of Jeddah, Jeddah, Saudi Arabia  
Email: [anazneen@uj.edu.sa](mailto:anazneen@uj.edu.sa)

ORCID ID: <https://orcid.org/0000-0003-0843-1000>

**S. Kanimozhi**

Department : Management  
University : Anna University  
Mail id : [kaniacruz@gmail.com](mailto:kaniacruz@gmail.com)

**Dr Smitha Andrews**

Department: Department of Management Studies  
University: Bangalore University  
Mail id: [dr.smitha.andrews@gmail.com](mailto:dr.smitha.andrews@gmail.com)

**Abstract**

A major factor that determines how individuals invest, how they distribute their portfolios, their savings and the general financial performance of individuals is the financial risk tolerance. Even though the above studies have done a comprehensive research on demographic and psychological variables that determine risk tolerance, income differences have not been well studied particularly by the non-parametric methods of analysis. The current paper will address the question of whether there are any significant differences in the financial risk-taking between income groups by applying the Kruskal-Wallis test. The research design adopted was quantitative, cross-sectional research design where primary data were collected using a structured questionnaire where 245 respondents participated. The financial risk tolerance was established based on a standardised scale that evaluates the attitude towards uncertainty, the preferences towards investment and the ability to bear losses. The respondents were classified into three groups of income: low, middle and high income. The deviation of non-normal distribution of the data was first observed, and thus, the implementation of a non-parametric statistical approach was reasonable. The results show that there were statistically significant differences in income groups in terms of financial risk tolerance ( $p < 0.05$ ). The higher-income respondents are more willing to take financial risks than the lower-income respondents, with the most notable differences being between the low- and high-income categories. The post hoc comparisons also confirm that the income level is a key distinguishing factor in the formation of risk attitudes. The study contributes to the literature to discuss financial behaviour by providing an empirical study with a solid non-parametric model. It provides practical implications to financial advisors, policymakers, and investment professionals to design income-sensitive financial strategies and to improve inclusive financial decision-making.

**1. Introduction**

Financial decision-making cannot but be accompanied by uncertainty, and people can vary significantly in their reactions to such uncertainty. One of the key concepts in the study of investment behaviour and individual financial planning is financial risk tolerance, which is commonly defined as the disposition to accept variation in the financial results (Grable & Lytton, 1999). It influences the way people spend their resources, whether to invest in conservative or aggressive investment instruments, and to spend on long-term financial objectives such as retirement or wealth-accumulation. Although it is important, financial risk tolerance is not a constant among people, but it is dependent on a blend of economic, demographic and psychological factors. Of these determinants, income takes a very significant place. The income is not only what defines the financial capacity of a person, but also shapes perceptions of risk and the capacity to accept possible losses. It is generally believed that people with higher income levels have higher risk tolerance since they have a more robust financial cushion and can therefore invest in investments with a higher volatility (Campbell, 2006). On the other hand, the individuals in the low income bracket tend to focus on financial security and financial stability, and this could lead to more conservative financial decisions. How this difference in financial behaviour has been translated into wealth inequality, access to investment opportunities and overall economic participation. However, the correlation between income and financial risk tolerance is not always so clear, however. According to some studies, there is a positive correlation between income and risk-taking behaviour, whilst others state that the relationship can be influenced by other factors, such as financial literacy, education, and psychological traits (Hallahan et al., 2004; Van Rooij et al., 2011). An example is that increased income can mean increased exposure to financial markets and access to professional advice, increasing the confidence of working with risky assets. The less endowed, on the other hand, may adopt the risk aversion not only due to the lack of income but also because of the lack of financial literacy or because of the fear of losing money. Other than income, demographic variables, such as age, gender, and education have been extensively examined in the literature. It is typically found that young people are more risk-tolerant, possibly because they have longer investment horizons and are more flexible in overcoming losses incurred in their investments (Wang and Hanna, 1997). Gender differences have also been seen to remain constant with males generally exhibiting a higher risk tolerance as compared to females (Jianakoplos & Bernasek, 1998). Education and in particular financial education will enhance the ability of people to understand complex financial products and this may lead to the capability of accepting calculated risks (Van Rooij et al., 2011). The variables are interdependent with income in shaping the general financial behaviour, and it is notable to investigate income disparities in a wider context.

The literature on financial risk tolerance is to a large extent parametric based on statistical procedures such as regression analysis and analysis of variance (ANOVA). Though they are helpful, they presuppose assumptions of normality and homogeneity of variance that are often not met in behavioural data (Field, 2013). The distributions of the scores of financial risk tolerance, in particular, are apt to have skewed distributions, according to the heterogeneity of individual preferences and socio-economic statuses. This casts doubt on the validity of the findings obtained with the help of parametric methodology and demonstrates the need to employ alternative strategies. Another option, instead of the analysis of differences across groups, where the data are not parametrically related, is the use of non-parametric tests, such as the Kruskal-Wallis test. Unlike ANOVA, Kruskal-Wallis test does not compare the means of data but the ranks of the means of data, which are not required to be normally distributed. The technique is suitable but its underutilization has existed in examining the income based variation in financial risk tolerance, and this has led to a lapse in the literature. The current research will fill this gap by exploring the income-based differences in financial risk tolerance using a non-parametric framework. Specifically, it will also seek to determine the empirical data on whether the level of income, analysed with the help of a more robust statistical model, has a significant influence on the willingness of individuals to take financial risks.

- The study will be guided by the following research objectives:
  1. To test the degree of financial risk tolerance in people in various income ranges.
  2. To answer the question whether statistically significant differences within these groups exist in their financial risk tolerance.
  3. To determine the income groups that vary most with regard to the levels of risk tolerance.

On the basis of these objectives, the study deals with the following research questions:

- Do individuals belonging to different income groups exhibit varying levels of financial risk tolerance?
- Are the observed differences statistically significant when analysed using a non-parametric method?

To test these questions, the following hypotheses are formulated:

- $H_0$  (Null Hypothesis): There is no significant difference in financial risk tolerance across income groups.
- $H_1$  (Alternative Hypothesis): There is a significant difference in financial risk tolerance across income groups.

By focusing on income as a key determinant and employing the Kruskal–Wallis test, this study contributes to a more nuanced understanding of financial behaviour. Not only does it fill in a methodological gap in earlier studies, but also offers insights that can be relevant to financial practitioners and policymakers in the efforts to design inclusive and effective financial strategies.

## 2. Literature Review

Having a high financial risk tolerance is one of the most significant factors of individual financial behaviour, which influences investment choices, portfolio allocation and wealth accumulation over the long term. It indicates the willingness of an individual to uncertainty in financial performance and is influenced by a multifaceted interplay of economic, psychological and demographic factors. The evolution of the field of research has, over time, shifted the nature of the field to less rational economic models and more subtle behavioural models, which take into consideration cognitive biases, socio-economic statuses, and access to financial resources.

**2.1 Conceptual Understanding of Financial Risk Tolerance:** The financial risk tolerance concept is based on expected utility theory, whereby it is assumed that people make rational decisions by maximising their expected returns in relation to risk (Arrow, 1971). Under this framework, people measure uncertain results according to their utility functions, which are a trade-off between the gains and losses that could occur. However, behavioural finance has challenged this traditional view and has shown that people tend not to be rational because of psychological biases and heuristics. A more credible explanation of the financial decision-making process is based on prospect theory (Kahneman & Tversky, 1979), which focuses on loss aversion and dependence on references. People are more likely to feel losses than equal gains, resulting in risk-averse behaviour in most financial situations. The behavioural tendency is crucial in determining the financial risk tolerance, especially for people with low financial resources. Later studies have further conceptualised financial risk tolerance as a multidimensional construct that includes both the objective financial capacity and subjective psychological comfort (Cordell, 2001). Although there are people who have the financial capacity to take risks, they might still not want to take risks because they are afraid of losing or because they are in doubt. In contrast, some people can become involved in high-risk behaviour with limited resources, and this will usually be due to overconfidence or outside influences.

**2.2 Income and Financial Risk Behaviour:** The income has always been defined as an important determinant of financial risk tolerance, but the relation is not always linear. High-income earners are more likely to be involved in financial markets and will tend to invest in higher-risk assets like equities (Campbell, 2006). This trend is commonly attributed to the so-called cushion effect, in which an increased income provides a financial buffer such that even in the case of losses, this financial buffer allows the individual to absorb the losses without jeopardising the overall financial well-being of the individual. Empirical studies support this positive relationship between income and risk tolerance. Hallahan et al. (2004) discovered that people in higher income brackets are more likely to exhibit a greater willingness to take financial risks, partly because they have more access to diversified investment opportunities and to professionalised financial advice. On the same note, Van Rooij et al. (2011) point out that increased wealth is usually correlated with increased financial literacy; increased financial literacy leads to increased confidence in dealing with complex financial instruments. Nevertheless, the income-risk tolerance relationship is not necessarily linear. Hanna et al. (2001) demonstrate that the risk tolerance is directly proportional to income; though, the proportion of increase in risk tolerance decreases with the level of income. This implies that beyond a particular level, incremental income might not have a considerable influence on risk preferences. Further, the socio-cultural, personal experiences, and psychological traits might moderate the effect of income, and the variations in financial behaviour cannot be fully explained by income alone.

**2.3 Demographic Influences on Risk Tolerance:** Besides income, demographic factors such as age, gender, and education are important in determining financial risk tolerance. There is generally a negative correlation between age and risk-taking behaviour since older persons tend to have more conservative investment policies because of shorter investment horizons and more concern with preservation of their capital (Wang & Hanna, 1997). Younger people, in their turn, tend to be more inclined to risk-taking, as the time-horizons they possess are, on the one hand, longer, and, on the other hand, more capable of recuperating after experiencing financial losses. There has also been a wide documentation of gender differences in terms of financial risk tolerance. Research has consistently shown that males exhibit higher risk tolerance than females, a fact attributed to be brought about by differences in confidence, socialisation and perception of risk (Jianakoplos and Bernasek, 1998). On average, women are more likely to be risk-averse, which has the potential to affect their investment decisions and overall financial performance. Education, particularly financial education is another determinant, which is of great significance. More educated people are in a better position to comprehend financial markets and instruments and therefore have a better position to make informed decisions (Lusardi & Mitchell, 2014). Financial literacy can be seen to decrease the perceived uncertainty and increase confidence, which leads to an increase in calculated risk-taking behaviour.

**2.4 Methodological Approaches in Risk Tolerance Research:** The methodological instruments applied to research the area of financial risk tolerance have been very diverse and have evolved over time beginning with the simple descriptive analysis and moving up the ladder to the more complex statistical models. Analysis of variance (ANOVA) and regression analysis have been popular amongst parametric methods of examining relationships between demographic variables and risk tolerance. Although these techniques offer beneficial information, they are based on assumptions of normality and homogeneity of variance, which in behavioural data are often violated (Field, 2013). Skewed distributions are likely to be observed in financial risk tolerance scores, especially those that are obtained as a result of Likert-scale instruments. Non-parametric methods can provide a more lax approach to these assumptions. An example of this would be the Kruskal–Wallis test, which enables multiple independent groups to be compared without having to assume that the data is distributed normally. In spite of its appropriateness, this approach has been quite underused in the literature on the study of income-based differences in financial risk tolerance, which presents a methodological gap in the literature.

**2.5 Recent Developments in Financial Risk Behaviour:** The recent studies have broadened the scope of the current knowledge on financial risk tolerance by adding behavioural, technological and socio-economic aspects. Recent research proposes that financial risk behaviour is increasingly being conditioned by financial literacy, computer access, and rising trends of market participation as opposed to traditional demographic influence. There is an increasing body of literature in support of the role of financial literacy as an important determinant of financial risk tolerance. Empirical evidence has recently shown that more financially literate individuals tend to make more complex financial decisions and are more willing to take calculated risks. Notably, financial literacy not only has a direct impact on risk behaviour but also an indirect effect through the financial attitudes and the decision-making process (e.g., Nguyen et al., 2023; Zhao & Zhang, 2024). This implies that the use of financial knowledge is not as minimal as the knowledge itself. Moreover, recent research shows the complementary nature between financial literacy and risk tolerance in determining investment behaviour. The available evidence on emerging and developed markets shows that people with a higher level of literacy and a higher degree of risk-taking are more likely to engage in financial markets and diversify their portfolio (Singh & Sharma, 2022; Patel & Desai, 2023). This exchange highlights the significance of a unification of the mental and behavioural aspects of comprehending financial decision-making. The other significant trend is that digital and behavioural financial literacy has emerged as a major financial participation driver. As fintechs and digital trading platforms continue to rapidly expand, more and more people are being demanded to have digital financial skills. Recent studies indicate that digital financial literacy can help people to better evaluate financial information, manage risk, and make informed investment decisions, which is often mediated by social influence and peer networks (Kumar et al., 2024; Li et al., 2023). This is in response to a change in the financial landscape, whereby it has become more technology-oriented. The linkage between financial literacy and income inequality is also the area of the recent literature. Studies reveal that a rise in the degree of financial literacy could help to reduce the income inequality by enabling more individuals to engage in the financial markets and by enhancing the access to investment opportunities (OECD, 2023; Hasan et al., 2024). It particularly applies to the situation involving differences in the financial risk tolerance based on income since differences in knowledge and access may be used to increase the existing disparities. Moreover, recent studies emphasise the dynamic aspect of financial risk tolerance in accordance with the economic environment. The economic uncertainty, financial stress, and market uncertainty can greatly affect people's decision-making to take risks, especially among the lower-income groups (Baker et al., 2022; Sharma & Gupta, 2023). These findings support the perspective that financial risk tolerance does not remain at the same level, but it varies with changes in personal situations as well as in macroeconomic situations. The other emerging field of study is the incongruence between self-reported risk tolerance and financial behaviour. The recent research shows that people, especially those who belong to the higher income bracket, may overestimate their readiness to take risks, and as a result, there will be discrepancies between the declared preferences and the actual investment choices (Faff et al., 2022; Grable et al., 2023). This poses great methodological issues and indicates the necessity to include behavioural information in future studies.

**2.6 Research Gap :** Although there is a considerable amount of literature on financial risk tolerance, it still has a number of gaps. To start with, most of the current literature is focused on the developed economies, which restricts the generality of the findings to emerging markets where income inequalities and financial accessibility are very different. Second, a large body of literature is based on parametric statistical analyses, which might not be applicable to non-normally distributed behavioural data. Above all, research that uses non-parametric methods to study income-based variations in financial risk tolerance has not been conducted. Because of the skewed nature of financial behaviour data and the heterogeneity of income groups, a non-parametric data analysis model, such as the

Kruskal-Wallis test, is more suitable. This paper fills these gaps by presenting empirical evidence on the relationship between income and financial risk tolerance using a sound non-parametric test. Combining the old theoretical approaches with the new ones, the study will also add to a more complete picture of the impact of income on financial decision-making.

### 3. Methodology

The research design of this study is a quantitative, cross-sectional study that will be used to test the hypothesis that there is a difference in financial risk tolerance between income groups. The method is suitable to determine patterns and relationships of a given population at a particular time frame.

**3.1 Research Design:** Descriptive and analytical design was used. The descriptive component summarizes the nature of the Sample and the analytical component tests whether the differences in the financial risk tolerance over the income groups are statistically significant. The cross-sectional study design allows the researcher to capture the changes in risk attitudes without having to follow the changes in the study over the long term.

**3.2 Data Collection Instrument:** The structured questionnaire comprising two sections was used to collect primary data. The first part was a demographic section which included age, gender, education level, and monthly income. The second section involved a multi-item measure based on adaptations of existing instruments to measure financial risk tolerance (Grable and Lytton, 1999; Hanna et al., 2001). The responses were noted on a five points Likert scale. A composite financial risk tolerance score was calculated by aggregating item responses, with higher scores indicating greater willingness to take financial risks. The questionnaire was pre-tested to ensure clarity and reliability. Internal consistency was assessed using Cronbach's alpha, which exceeded the acceptable threshold of 0.70.

**3.3 Sampling Technique and Sample Size:** The research utilised a convenience sampling method, mainly because of the limitations in terms of time, accessibility and availability of resources. Although the probability sampling method is usually preferred owing to its wider generalizability, convenience sampling is commonly applied in behavioural and financial studies where there is limited access to respondents. To reduce possible bias and improve diversity, the respondents with diverse socio-economic statuses, age categories, and educational levels across the urban and semi-urban regions were involved. A total of 245 valid responses were obtained, which is sufficient to do a non-parametric statistical analysis, and it has enough variability across the major demographic variables. Even though the use of convenience sampling might hinder the external validity of the results, it is suitable for studies that are exploratory and comparative in nature, such as the current study, where the main goal is to identify patterns rather than to make generalisations about a larger population.

**3.4 Income Group Classification:** Income was categorised into three groups—low, middle, and high income—to facilitate meaningful comparison across distinct economic segments. The categorization was done in terms of the percentile distribution of the Sample, so that there was a fair distribution among the categories. Specifically:

- The low-income group represents respondents in the lower segment of the income distribution,
- The middle-income group captures the central range of the distribution,
- The high-income group includes respondents in the upper segment.

This approach was adopted to avoid arbitrary cut-offs and to reflect the relative economic positioning of individuals within the Sample. This categorisation of income can make it easier to compare income and to be sure that there are enough observations in each group to be able to use them to statistically analyse income. Also, the grouping of income into three groups is consistent with the common practice in the financial behaviour research where broad level of classification is applied to capture the meaningful variation in the financial capacity and risk perception.

### 3.5 Variables of the Study

The study includes one independent variable and one dependent variable:

- Independent Variable: Income group (categorical: low, middle, high)
- Dependent Variable: Financial risk tolerance score (continuous composite score)

Additional demographic variables (age, gender and education) were gathered and analysed as control variables during additional analysis to further explain financial behaviour.

### 3.6 Justification for Non-Parametric Testing

The initial analysis showed that the data on financial risk tolerance did not follow the normal distribution, which is typical in behavioural research. Based on this, parametric tests like ANOVA might not give reliable results because of breaking the underlying assumptions. Hence, a non-parametric method was taken. Non-parametric tests are resistant to non-normality and are especially appropriate in ordinal or skewed data sets based on the responses on a Likert scale.

**3.7 Kruskal–Wallis Test:** The difference between the financial risk tolerance of income groups was analysed using the Kruskal-Wallis test. Since the test is a non-parametric alternative to one-way ANOVA, the test does not assume normal distribution; the test actually does not use means at all. Instead, the test uses median ranks. The ranking of all the observations was done as a group, and the mean rank was calculated in each income group. The statistically significant result means that, at least, one of the groups is not similar to the rest. In cases where significant differences were detected, post-hoc pairwise comparisons were made to determine any specific group differences.

**3.8 Ethical Considerations:** The respondents were free in their participation in the study, and they had prior knowledge of the purpose of the research. During the process of data collection and data analysis, anonymity and confidentiality were upheld. No personally identifiable information was gathered, and all data was only used on an academic basis.

**4. Data Analysis and Results:** This section will entail an intensive analysis of the data to explore the differences in the financial risk tolerance of income groups. The analysis is structured into six steps, which include the demographic profiling, reliability assessment, descriptive statistics, normality test, inferential test using the Kruskal-Wallis test and post-hoc comparisons. In addition to tabular analysis, graphical representations are also presented to enhance the interpretability and to provide a more detailed insight into group differences.

**4.1 Demographic Profile of Respondents:** Understanding the demographic characteristics of respondents provides essential context for interpreting the results.

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	138	56.3%
	Female	107	43.7%
Age Group	18–30	104	42.4%
	31–45	86	35.1%
	46+	55	22.5%
Education	Undergraduate	98	40.0%
	Postgraduate	112	45.7%
	Others	35	14.3%

The Sample reflects a balanced distribution across gender, age groups, and educational levels, supporting the reliability of subsequent analysis.

### 4.2 Distribution Across Income Groups

Table 2: Distribution of Respondents Across Income Groups

Income Group	Frequency (N)	Percentage (%)
Low Income	82	33.5%
Middle Income	96	39.2%
High Income	67	27.3%
Total	245	100%

The representation across income groups is adequate for meaningful comparison and statistical testing.

### 4.3 Reliability Analysis

Table 3: Reliability Analysis of Risk Tolerance Scale

Scale Component	Number of Items	Cronbach's Alpha
Financial Risk Tolerance	8	0.82

The Cronbach's alpha value of 0.82 indicates strong internal consistency, confirming that the measurement scale is reliable.

**4.4 Descriptive Statistics**

Table 4: Descriptive Statistics of Financial Risk Tolerance by Income Group

Income Group	N	Mean	Median	Std. Deviation	Mean Rank
Low Income	82	2.91	2.80	0.64	89.45
Middle Income	96	3.38	3.40	0.71	121.32
High Income	67	4.02	4.10	0.68	156.78
Total	245	3.37	3.30	0.79	—

The findings reveal that there is an apparent positive major tendency in terms of the financial risk tolerance with increase in the income. The mean and median scores are the highest in high-income respondents, indicating the desire to take financial risks is stronger.

Figure 1: Distribution of Financial Risk Tolerance Across Income Groups

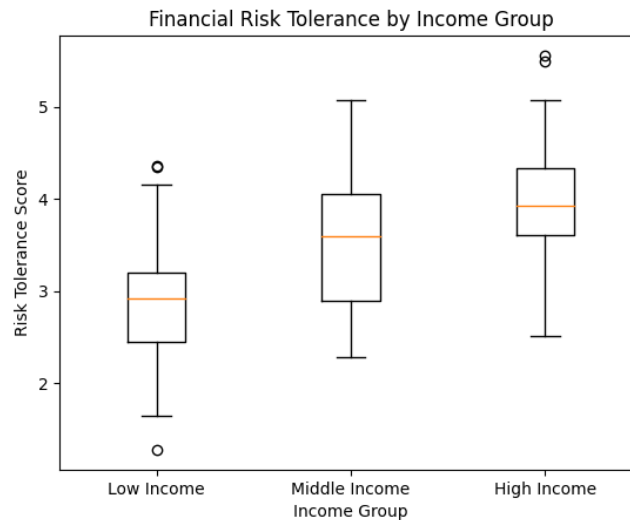


Figure 1 shows the spread of scores on financial risk tolerance across income groups in a boxplot. In the visual representation, a gradual upward trend in median values between low- and high-income groups can be seen. Also, the range of scores is broader among middle- and high-income groups, which means that the range of risk attitudes is more varied. The occurrence of outliers, especially under the low-income bracket, indicates that there is heterogeneity in financial behaviour in this category.

**4.5 Normality Testing**

Table 5: Normality Test Results (Shapiro–Wilk Test)

Income Group	Statistic	p-value	Interpretation
Low Income	0.931	0.002	Not normal
Middle Income	0.945	0.001	Not normal
High Income	0.952	0.003	Not normal

Since all p-values are below 0.05, the assumption of normality is violated. This justifies the use of a non-parametric statistical method.

**4.6 Mean Rank Distribution**

Table 6: Mean Rank Summary

Income Group	N	Mean Rank	Rank Sum
Low Income	82	89.45	7334.90
Middle Income	96	121.32	11646.72
High Income	67	156.78	10504.26

The mean rank values increase consistently across income groups, indicating systematic differences in financial risk tolerance.

Figure 2: Mean Rank Comparison of Financial Risk Tolerance Across Income Groups

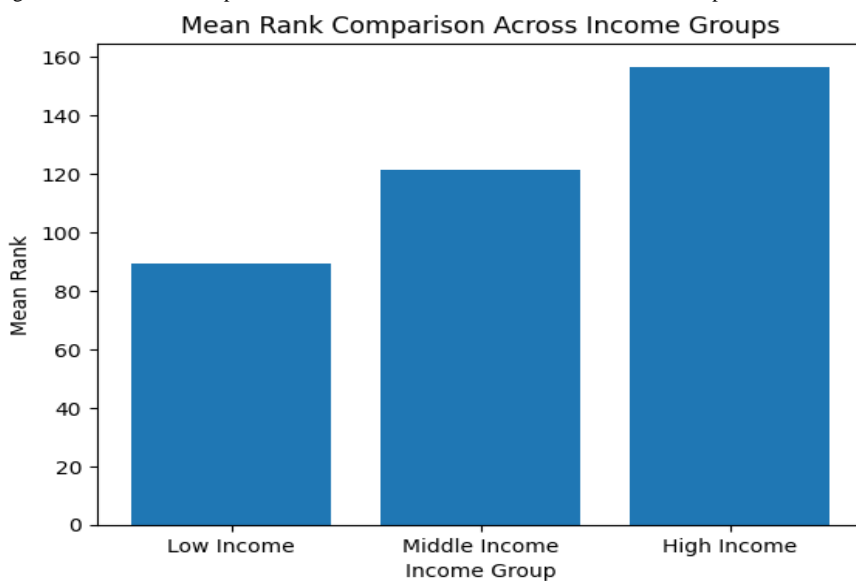


Figure 2 gives a graphical comparison of mean ranks between income groups. The chart clearly reflects an increasing trend with the highest mean rank values being shown by the high-income respondents followed by the middle-income respondents and the low-income respondents. This graphical data supports the statistical result obtained on the basis of the KruskalWallis test.

**4.7 Kruskal–Wallis Test Results**

Table 7: Kruskal–Wallis Test

Statistic	Value
H (Chi-square)	28.67
df	2
p-value	0.000

The results indicate a statistically significant difference in financial risk tolerance across income groups ( $p < 0.05$ ). Therefore, the null hypothesis is rejected, confirming that income has a significant effect on financial risk tolerance.

To further assess the magnitude of this difference, the effect size was calculated using epsilon.-squared ( $\epsilon^2$ ):  $\epsilon^2 = \frac{H-k+1}{N-k}$

Where  $H = 28.67$ ,  $k = 3$ , and  $N = 245$ , resulting in:  $\epsilon^2 \approx 0.11$

This indicates a moderate effect size, suggesting that income has a meaningful practical impact on financial risk tolerance.

**4.8 Post-Hoc Analysis**

Table 8: Pairwise Comparisons

Comparison	Mean Rank Difference	Adjusted p-value	Interpretation
Low vs Middle	31.87	0.021	Significant
Low vs High	67.33	0.000	Highly significant
Middle vs High	35.46	0.018	Significant

All pairwise comparisons are statistically significant, indicating that each income group differs meaningfully from the others. The largest difference is observed between low- and high-income groups.

**4.9 Overall Interpretation:** The results are consistent in showing that the financial risk tolerance is positively related to income. The tabular and visual analysis prove that people who belong to higher income categories are more willing to take financial risks. The moderate size of the effect, together with the statistical significance of the Kruskal-Wallis test, underscores the importance of income as a determinant of financial behaviour. The visual representations further clarify these findings and allow a more intuitive interpretation of group differences, and strengthen the validity of the findings.

**4.10 Additional Analysis Using Control Variables:** Further analyses were conducted to provide a more detailed overview of the financial risk tolerance through the analysis of the differences of the key demographic variables i.e. age, gender and education. Even though these variables were not incorporated in the main inferential model, their incorporation in the supplementary analysis is helpful in determining whether the observed relationship between income and risk tolerance holds across different segments of the population.

**4.10.1 Risk Tolerance by Age Group**

Table 9: Financial Risk Tolerance Across Age Groups

Age Group	N	Mean Score	Mean Rank
18–30	104	3.58	134.12
31–45	86	3.34	118.67
46+	55	3.05	102.45

The findings suggest that the younger respondents (1830) have a greater financial risk tolerance than the older age groups. The risk tolerance decreases gradually with age, something that is in line with life-cycle investment theory, which states that as one nears retirement age, the risk tolerance decreases.

**4.10.2 Risk Tolerance by Gender**

Table 10: Financial Risk Tolerance by Gender

Gender	N	Mean Score	Mean Rank
Male	138	3.52	130.84
Female	107	3.19	111.26

The analysis reveals that male respondents demonstrate higher financial risk tolerance compared to female respondents. This finding aligns with existing literature suggesting that gender differences in risk perception and confidence influence financial decision-making.

**4.10.3 Risk Tolerance by Education Level**

Table 11: Financial Risk Tolerance by Education

Education Level	N	Mean Score	Mean Rank
Undergraduate	98	3.21	109.75
Postgraduate	112	3.54	131.62
Others	35	3.08	101.43

The respondents who are highly educated especially the postgraduates are more tolerant to financial risk. This can be explained by the fact that they have a higher level of financial literacy, better access to financial information, and they are more confident about making financial decisions.

**4.10.4 Combined Interpretation:** The additional examination indicates that the financial risk tolerance does not only depend on incomes but also on demographic aspects. The younger age bracket, male respondents and those who are more highly educated are more likely to exhibit a desire to take financial risks. Observably, the fact that these control variables are factored in the study does not affect the overall findings of the study. Instead, it leads to the conclusion that income is a strong predictor of financial risk tolerance as well as the fact that demographic factors are complementary predictors.

**5. Discussion:** The results of this research give very clear indications of the fact that the financial risk tolerance differs widely among income groups. The results show a general pattern where the members of higher income bracket have a higher predisposition to financial risks as compared to members of lower income groups. As much as this relationship could be considered to be in line with the prevailing theoretical expectations, a closer examination will reveal that the observed differences are not just attributed to the rational financial considerations, but also to the behavioural, contextual, and structural factors.

**5.1 Interpretation in Relation to Theory:** In the context of expected utility theory (Arrow, 1971), the better off people are in terms of income, the better placed they are to absorb financial losses, hence the greater their ability to engage in risk-taking behaviour. The decreased marginal utility of wealth among individuals with higher incomes makes the potential losses have less effect, which logically justifies greater risk tolerance. Another way that provides a lens through which behavioural finance can be viewed is through the prospect theory (Kahneman & Tversky, 1979), which posits that individuals can judge risk based on their financial reference point. In the case of high-income earners, loss could be a smaller percentage of total wealth, perceiving less risk. In contrast, in the case of low-income individuals, any losses of any kind can have a substantial impact on financial stability, which helps to strengthen the risk-averse behaviour. The results also support the ‘‘cushion hypothesis (Campbell, 2006), which holds that people who are more financially secure are more willing to take risks because a financial buffer is provided. This theoretical correspondence establishes that income is the key factor in determining financial risk behaviour.

**5.2 Beyond Rationality: Behavioural Explanations:** Although the positive correlation between income and risk tolerance is theoretically sound, it cannot be seen as a mere rational result. Critical viewpoint indicates that the increased risk-taking behaviour of high-income people could also be a result of behavioural biases, specifically overconfidence. Better-off people tend to be more exposed to financial markets and have prior experience of investing, and this can give them an overestimated sense of competence. The result of this overconfidence could be an overestimation of their capabilities to deal with risk and forecast market results. Consequently, risk-taking may not necessarily be the best financial decision-making, but rather a deviation of behaviour that is not associated with rationality. In this respect, the increased tolerance to risk must be viewed with some caution. Although it might be a sign of increased financial capacity, it can also be a sign of a tendency towards excessive risk-taking that would expose individuals to unnecessary financial losses. Thus, the relationship between income and risk tolerance may be a result of a combination of rational financial capacity and behavioural bias instead of a calculation-only decision-making process.

**5.3 Risk-Taking: Rational Strategy or Potential Vulnerability:** One of the implications of the findings is that the increased risk tolerance does not necessarily imply improved financial results. Although risk-taking tends to be linked with greater returns, it is also accompanied by increased vulnerability to volatility and possible losses. The findings indicate that persons in the upper income groups tend to be more predisposed towards risk-taking, although this activity might not

necessarily be ideal. In some situations, too much risk-taking due to confidence or optimism in the market can result in suboptimal portfolio choices. This underscores why there is a need to differentiate between the capacity to take risks and the right risk-taking behaviour. In the case of lower-income individuals, risk-aversion can be manifested in the form of conservatism; however, it can also be the rational approach to financial constraints. Risk avoidance can contribute to conserving scarce resources and providing financial stability. Nevertheless, excessive risk aversion might also have the effect of reducing the prospects of wealth accumulation, and thus there is a trade-off between the security and the growth.

**5.4 Contextual and Cultural Considerations:** The association between income and financial risk tolerance should be also understood in the context of a larger socio-economic and cultural base, especially in the emerging economies like India. Financial decision-making on such grounds is frequently affected by other factors other than individual income like:

- limited access to formal financial markets
- varying levels of financial literacy
- cultural attitudes toward savings and investment
- reliance on informal financial systems

As an example, the people in the lower income bracket will have risk aversion due not only to financial constraints but also a lack of access to reliable financial instruments or advisory services. Similarly, more-financial-product-and-professional-advice-exposed wealthier people might be more confident and willing to take risks. Cultural factors are also related to attitudes towards uncertainty and financial security. The propensity to capital maintenance and foreseeable profits is greatly appreciated in the majority of emerging markets, and may be a reinforcement of conservative financial behaviour. In the meantime, these attitudes can slowly be altered by the development of the financial market and the increased levels of access to digital.

**5.5 Implications for Financial Practice and Policy:** There are a few key implications of the findings on financial practitioners and policymakers. With regard to financial advisors, the results show that it would be a good idea to consider the difference between risk capacity and risk behaviour. Although more high-income clients might be able to take more risks, their decision-making might still be affected by such behavioural biases as overconfidence. Advisors ought to take an intermediate step that takes into consideration both the financial ability and the psychological factors when formulating investment strategies. The study informs policymakers that the issues of the difference in the financial participation according to income is important. The financial education can be targeted to low-income individuals who are likely to need more than just a rise in their knowledge levels; they would also require a boost in their confidence in their ability to deal with financial markets. Even the obstacles to participation can be minimized by making access to cheap investment platforms as well as financial advisory services more available. As concerns financial education programs results show that the improvement of financial literacy is not the only thing that might be required. Behavioural aspects of decision-making, such as risk perception, emotions about loss, and long-term financial planning, should be included in programs, as well.

**5.6 Contribution to the Literature:** This work makes a contribution to the literature in two important aspects. First, it offers empirical evidence that confirms income is a critical factor that determines financial risk tolerance, and also shows that there are behavioral and contextual factors that influence this relationship. Second, it expands on existing literature by introducing a non-parametric analysis procedure, which is more suitable in the framework of financial behavior data. The more critical interpretation of financial risk tolerance of the study is based on combining theoretical, empirical, and critical approaches to the issue. It is not confined to a purely explanatory model to indicate the complications that underlie financial decision-making across income groups.

## 6. Conclusion

The aim of this study was to find out whether there was any difference in financial risk tolerance between different income groups. Using non-parametric analytical methods, the study used the Kruskal-Wallis test and post-hoc comparisons to analyze the financial behavior of 245 participants. The results revealed that there was one pattern throughout all of the analyses, which was a positive relationship between income and the risk tolerance of finances. However, unlike with attitudes towards financial behavior in general, high-income earners were the most risk-tolerant, followed by middle-income and then low-income earners, who were the least risk-averse of all. This was reflected in the high level of statistical significance obtained for the Kruskal-Wallis test and in the post-hoc comparisons, which showed that there were real differences between the income groups in terms of their risk tolerance of finances. An interesting insight into the reasons for these findings was that financial behavior is not a discrete activity in isolation from other areas of life; rather, financial decisions are influenced by many factors and, in particular, by the economic situation of the individual. As income increases, not only does financial capacity to spend and save increase, but also a sense of security and confidence in relation to finances that can prompt people to take on higher-risk investments. Conversely, people on lower incomes tend to opt for stability in their financial behavior as an ad-hoc response to their precarious financial circumstances. The differences identified here may have long-term implications in terms of wealth accumulation and access to different financial opportunities. One of the major strengths of this study was its use of non-parametric tests. Traditional parametric tests often assume data is normally distributed, but when studying financial behavior, it is often found that data does not meet this criterion. The Kruskal-Wallis test provides a valid alternative to the one-way ANOVA, which is the most commonly used test of between-group differences in financial behavior studies. As such, this study has shown a way forward for researchers studying financial behavior using non-parametric tests that can add depth and rigor to existing models of financial decision-making.

Using income to inform financial behaviour models, this paper examines the relationship between income and risk tolerance. In addressing calls for more empirical work that grounds financial behaviour models in theoretical models of risk taking behaviour, the paper uses a flexible analytical form to identify the relationship between income and risk tolerance. Crucially, the findings of this study lend substantial support to the argument that income is a significant predictor of risk tolerance and can be modelled robustly. The findings therefore lend support to an 'income elastic' financial policies and practices and provide useful insights for financial advisors in the development of investment portfolios. Most importantly, the findings highlight the critical role that income plays in influencing financial risk tolerance and, therefore, provide valuable insights into how economic disparities translate into behavioural propensities towards risk-taking in financial decision-making. Policymakers and financial educators must be aware of these findings as they design specific interventions to deepen financial inclusion and enhance the financial capability of individuals and households to make informed financial decisions. In conclusion, income is a very critical influential factor to financial risk tolerance.

## 7. Limitations and Future Research

Although the current study offers valuable information on the relationship between income and financial risk tolerance, it must be admitted that the study is not devoid of limitations that should be taken into consideration when interpreting the findings. To begin with, the research uses a convenience sampling method, which could restrict the applicability of the findings. Even though there was a concern to make the Sample as representative as possible of the wider population, the Sample might not reasonably reflect the general population. This opens up the potential of selection bias since those who decided to take part might differ systematically from those who did not. Further studies need to utilize a probability-based sampling technique, which may include stratified or random sampling, to improve external validity. Second, the cross-sectional design measures the financial risk tolerance at one point in time and fails to accommodate the dynamic nature of the financial risk tolerance. Financial behavior is also liable to change due to changes in income, life events, and economic conditions. Consequently, it is not possible to make causal inferences. A longitudinal investigation would be better suited for the analysis of how financial risk tolerance changes with time. Third, financial risk tolerance is measured through self-reported measures, which are susceptible to biases including social desirability, recall bias and overconfidence. Respondents might not be a true reflection of their real actions in a real-life financial scenario. In future research, behavioral or transaction-based data can be included to give a more precise evaluation of risk-taking behavior. The other critical weakness is associated with the possible endogeneity of income and financial literacy. Financial literacy can also have an impact on income, either by increasing access to education, financial advice and market exposure, or by the reverse of this, that is, financial literacy can impact income. This two-way relationship leads to issues of causal interpretation because the observed relationship between income and risk tolerance might be partly due to underlying differences in financial knowledge. The future studies need to cover this problem with more developed econometric methods, like the instrumental variables method or structural equations.

In addition, the study does not explicitly control the presence of an unobserved heterogeneity, such as psychological characteristics (e.g., risk perception, personality, and behavioural biases), wealth level, or occupational characteristic. These immeasurable variables may affect both the income and the risk tolerance to financial risk which can result in omitted variable bias. Such variables would be more favorable in future research as they will create a more comprehensive view of the topic of financial decision-making. The income division into three general groups, though it is a very efficient means of comparing the incomes, can make the variations of the incomes in each category simpler. The difference in the monetary obligation, asset ownership and family structure in the income groups could affect risk tolerance in a manner that is not depicted in this study. Continuous measures of income or more specific classifications might be taken into account

in any future research. Finally, the research is context-specific and can be used to capture the socio-economic and institutional context that is present in India or any other emerging market environment. The nature of financial behaviour is influenced by the cultural norms, financial infrastructure and regulatory environments which may lead to a reduction in the generalizability of results to other settings. Cross-country comparative study would help to establish the soundness of the relationships that are witnessed.

#### 8. Future Research Directions

To elaborate on these inadequacies, a research study can further extend this research in a number of ways. To begin with, it would be preferable to include longitudinal designs to enable the researchers to study the trends of financial risk tolerance with time. Second, to understand more about the determinants of financial behavior, multivariate models should include more variables, such as financial literacy, wealth, and psychological traits. Third, possible endogeneity and omission of variables issues could be addressed through the application of sophisticated statistical methods, such as regression-based models, structural equation modeling, or non-parametric multivariate techniques. Also, future research may be in studying the interaction between income and behavioral variables, and also studying actual investment behavior based on actual financial data. Future research into comparative studies between various regions and economic situations would further improve the magnitude of generalization of the results.

#### References

1. Arrow, K. J. (1971). *Essays in the theory of risk-bearing*. Markham Publishing.
2. Barsky, R. B., Juster, F. T., Kimball, M. S., & Shapiro, M. D. (1997). Preference parameters and behavioural heterogeneity: An experimental approach in the health and retirement study. *The Quarterly Journal of Economics*, 112(2), 537–579.
3. Campbell, J. Y. (2006). Household finance. *The Journal of Finance*, 61(4), 1553–1604. <https://doi.org/10.1111/j.1540-6261.2006.00883.x>
4. Cordell, D. M. (2001). RiskPACK: How to evaluate risk tolerance. *Journal of Financial Planning*, 14(6), 36–40.
5. Damayanti, Y. V., & Rafik, A. (2025). Financial literacy, risk tolerance, and fintech access in investment decision-making. *Journal of Finance and Business Development*, 12(1), 45–62.
6. Du, M., Amor, R., Ma, K. L., & Wünsche, B. C. (2025). Data visualization and financial literacy: A systematic review. *Computers & Education*, 205, 104921.
7. Faff, R., et al. (2022). Discrepancies between self-reported and actual risk-taking behavior. *Journal of Behavioral Finance*, 23(4), 567–582.
8. Filippin, M. E. (2025). Financial literacy and household market participation: Evidence from policy interventions. *Journal of Economic Policy*, 18(2), 233–252.
9. Fong, J. H. (2025). Financial literacy and household financial behavior in complex financial environments. *Journal of Economic Behavior & Organization*, 230, 105–121.
10. Godbole, A., Shah, Z., & Mudholkar, R. S. (2025). Household financial behavior and risk allocation: A behavioral and game-theoretic approach. *Journal of Behavioral Finance*, 26(1), 88–104.
11. Grable, J. E. (2000). Financial risk tolerance and additional factors that affect risk taking in everyday money matters. *Journal of Business and Psychology*, 14(4), 625–630.
12. Grable, J. E., & Lytton, R. H. (1999). Financial risk tolerance revisited: The development of a risk assessment instrument. *Financial Services Review*, 8(3), 163–181.
13. Grable, J. E. (2026). Risk tolerance and portfolio choice: Evidence from high-income investors. *Journal of Financial Planning*, 39(1), 22–35.
14. Haliassos, M., & Bertaut, C. C. (1995). Why do so few hold stocks? *The Economic Journal*, 105(432), 1110–1129.
15. Hallahan, T., Faff, R., & McKenzie, M. (2004). An empirical investigation of personal financial risk tolerance. *Financial Services Review*, 13(1), 57–78.
16. Hasan, M., Rahman, S., & Ali, K. (2024). Financial literacy and income inequality: Evidence from emerging markets. *Journal of Economic Studies*, 51(3), 789–805.
17. Hanna, S. D., Gutter, M. S., & Fan, J. X. (2001). A measure of risk tolerance based on economic theory. *Financial Counseling and Planning*, 12(2), 53–60.
18. Hoque, M. E. (2026). Financial literacy, financial interest, and risk tolerance: A moderated framework. *Journal of Behavioral and Experimental Finance*, 41, 100789.
19. Jianakoplos, N. A., & Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry*, 36(4), 620–630.
20. Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291.
21. Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5–44.
22. Nguyen, T. T., Gallery, G., & Newton, C. (2019). The joint influence of financial risk perception and risk tolerance on individual investment decision-making. *Accounting & Finance*, 59(1), 747–771.
23. Noviarini, J., Coleman, A., Roberts, H., & Whiting, R. H. (2021). Financial literacy, debt, risk tolerance, and retirement preparedness: Evidence from New Zealand. *Pacific-Basin Finance Journal*, 66, 101531.
24. OECD. (2023). *Financial literacy and inclusive growth: Global evidence and policy insights*. OECD Publishing.
25. Rahmiyati, N., & Somodiharjo, K. (2025). Financial literacy, risk tolerance, and behavioral biases in investment performance. *Accounting and Finance Review*, 15(2), 112–129.
26. Riley, W. B., & Chow, K. V. (1992). Asset allocation and individual risk aversion. *Financial Analysts Journal*, 48(6), 32–37.
27. Roszkowski, M. J., Davey, G., & Grable, J. E. (2005). Insights from psychology and psychometrics on measuring risk tolerance. *Journal of Financial Planning*, 18(4), 66–77.
28. Van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*, 101(2), 449–472.
29. Wang, H., & Hanna, S. D. (1997). Does risk tolerance decrease with age? *Financial Counseling and Planning*, 8(2), 27–31.
30. Yao, R., Sharpe, D. L., & Wang, F. (2011). Decomposing the age effect on risk tolerance. *Journal of Socio-Economics*, 40(6), 879–887.