Contents lists available at Universitas Muhammadiyah Lampung

Hipotenusa Journal of Research Mathematics Education

Journal homepage: https://journal.uml.ac.id/index.php/HT/index

The role of numeracy literacy in financial behavior and spending decisions among mathematics education students at UIN Alauddin Makassar

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A R T I C L E I N F O

Keywords:
Numeracy literacy;
Financial behavior;
Spending decisions;
Financial decision-making;
Mathematics education students.

A B S T R A C T

Numeracy literacy provides a relevant context for students' everyday financial decision-making because financial activities require the interpretation of numerical information, comparison of alternatives, budget planning, prioritization of needs, and evaluation of expenditures. This issue is relevant to Mathematics Education students because quantitative reasoning can be applied beyond formal mathematics learning, particularly in managing financial resources and spending decisions. This study aims to examine financial behavior, level of need, and student expenditure among Mathematics Education students at UIN Alauddin Makassar and to interpret the findings within a numeracy literacy perspective. The study employed a quantitative survey approach using descriptive and inferential analyses. Primary data were collected through a five-point Likert-scale questionnaire from 31 students and analyzed using multiple linear regression. The descriptive results show that financial behavior, level of need, and student expenditure were all classified as High, with mean scores of 3.78, 3.65, and 3.72, respectively. The inferential analysis examines the partial and simultaneous relationships of financial behavior and level of need with student expenditure. The findings indicate that financial behavior and level of need are relevant to student expenditure, while the level of need shows a more dominant contribution than financial behavior based on the regression results. From a numeracy perspective, financial decision-making involves quantitative reasoning through budgeting, comparing needs and wants, estimating costs, prioritizing expenditures, and evaluating affordability. Numeracy is therefore positioned in this study as an interpretive perspective rather than a statistically tested variable.

1. Introduction

Financial management is an important aspect of students' daily lives because students must allocate limited financial resources to meet academic and non-academic needs [1]. However, students may experience difficulties in managing their finances, including limited budgeting, inadequate expense recording, and low saving practices [2]. Limited financial resources and insufficient experience in financial planning may further affect students' ability to manage expenditures [3]. Financial attitudes and knowledge are also associated with spending behavior because financial understanding can help students distinguish between needs and wants when making spending decisions [4].

The financial conditions of students provide an important context for examining these issues. Based on the 2025 National Survey on Financial Literacy and Inclusion (SNLIK) published by the Financial Services Authority, Indonesia's financial literacy index reached 66.46%, while the financial inclusion index reached 80.51% [5]. Although these indicators show the development of financial literacy and inclusion, the difference between financial understanding and its application in daily financial activities remains relevant, particularly among younger groups, including university students. This condition may be reflected in students' difficulties in managing expenditure, prioritizing needs, and planning the use of available financial resources [5].

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https://doi.org/10.36269/hjrme.vxix.xxx
Received 10 July 2026; Received in revised form 20 July 2026; Accepted 30 July 2026
Available online 01 August 2026
2723-486X/Published by Universitas Muhammadiyah Lampung.

Student expenditure is also influenced by contemporary consumption patterns. The modern lifestyle of university students may encourage spending that is not always based on priority needs but is also influenced by trends, social status, and social

environments [10]. Spending on lifestyle activities, such as visiting cafés, purchasing discounted products, and following current trends, may further encourage students to prioritize wants over needs [11]. These conditions demonstrate the relevance of examining financial behavior and level of need in relation to student expenditure.

The financial context is also relevant to mathematics education because financial decision-making involves quantitative information and reasoning. Numeracy literacy includes the use of mathematical knowledge and quantitative reasoning to interpret information, compare alternatives, estimate costs, calculate percentages, prepare budgets, and make decisions in real-life situations. The OECD PISA financial literacy framework recognizes numeracy or mathematical literacy as relevant to financial decision-making because individuals frequently need to manipulate monetary quantities and perform basic numerical calculations [42]. For Mathematics Education students, financial behavior and spending decisions therefore provide an authentic context for applying quantitative reasoning beyond formal mathematics coursework.

Previous studies have examined financial behavior and student expenditure from several perspectives. Research [13] indicates that financial behavior contributes to effective financial management, while studies [23, 24] report that spending behavior may be influenced by social environment, lifestyle, and the convenience of digital transactions. Other studies have examined the relationship between financial behavior, needs, and spending decisions [12, 15, 17, 18, 21]. Studies [19, 20, 22, 25] further indicate the relevance of financial behavior and needs in explaining financial decisions and expenditure. Studies [15, 16, 29] also show that economic conditions and students' needs are associated with expenditure patterns. These studies provide empirical support for examining financial behavior and level of need as factors related to student expenditure.

However, previous studies have generally focused on financial behavior, financial literacy, consumption patterns, needs, or spending decisions as financial constructs. The present study places these variables specifically within the context of Mathematics Education students and connects their financial decision-making with numeracy literacy as an interpretive perspective. This distinction is important because financial decisions require students to work with quantities, compare alternatives, estimate available resources, prioritize expenditures, and evaluate whether spending is consistent with available funds. Thus, the study does not statistically test numeracy literacy as an independent variable; rather, numeracy is used to interpret the quantitative reasoning involved in the observed financial behavior and spending decisions.

The novelty of this study lies in examining financial behavior (X_1) and level of need (X_2) simultaneously in relation to student expenditure (Y) among Mathematics Education students at UIN Alauddin Makassar, while interpreting the findings through the context of numeracy literacy. This combination provides a specific mathematics-education context for understanding how quantitative reasoning is embedded in students' everyday financial decisions. The study therefore contributes empirical evidence concerning financial behavior and spending decisions while identifying the practical relevance of numeracy in authentic financial situations.

Based on these problems and the identified research gap, this study uses a quantitative survey approach with multiple linear regression analysis. The analysis examines the relationship of financial behavior and level of need with student expenditure, both partially and simultaneously, among Mathematics Education students at UIN Alauddin Makassar. The research questions are as follows:

1. How does financial behavior affect the expenditure of students of the Mathematics Education Study Program of UIN Alauddin Makassar?
2. How does the level of need affect the expenditure of students of the Mathematics Education Study Program of UIN Alauddin Makassar?
3. How do financial behavior and the level of need simultaneously affect the expenditure of students of the Mathematics Education Study Program of UIN Alauddin Makassar?

The purpose of this study is to analyze the relationship between financial behavior and student expenditure, analyze the relationship between the level of need and student expenditure, and analyze the simultaneous relationship of financial behavior and level of need with student expenditure among Mathematics Education students at UIN Alauddin Makassar. The findings are also interpreted from a numeracy literacy perspective by identifying the quantitative reasoning involved in budgeting, prioritizing needs, comparing alternatives, and making expenditure decisions.

2. Method

This study uses a quantitative approach with a survey method to obtain numerical data through the distribution of questionnaires to respondents. The quantitative approach was selected because the study examines the relationship between financial behavior, level of need, and student expenditure using numerical data and statistical analysis. The study specifically analyzes financial behavior (X_1) and level of need (X_2) as independent variables and student expenditure (Y) as the dependent variable. Multiple linear regression was used because the study examines the partial and simultaneous relationships of two independent variables with one dependent variable.

2.1. Research design

This study employs a quantitative correlational survey design. The design was selected to examine the relationship of financial behavior and level of need with student expenditure based on numerical data obtained through questionnaires. Financial behavior (X_1) and level of need (X_2) were treated as independent variables, while student expenditure (Y) was treated as the dependent variable. The use of multiple linear regression is aligned with the research objectives because the analysis examines the relationship of two independent variables with one dependent variable, both individually and

simultaneously.

The study does not statistically test numeracy literacy as an independent variable. Numeracy is positioned as an interpretive perspective for understanding the quantitative reasoning involved in financial behavior and spending decisions, such as budgeting, comparing expenditure alternatives, estimating available resources, and prioritizing needs. This positioning is consistent with the mathematics-education focus of the study while maintaining the original statistical model based on financial behavior, level of need, and student expenditure.

2.2. Research Setting and Participants

This research was conducted in the Mathematics Education Study Program, Alauddin State Islamic University, Makassar, during the 2025/2026 academic year. The population consisted of active students of the Mathematics Education Study Program at UIN Alauddin Makassar. The sample consisted of 31 active students who met the respondent criteria and were willing to participate in the research. Participants were selected using purposive sampling based on the criteria of being active students of the Mathematics Education Study Program and voluntarily agreeing to participate.

Data were collected through an online questionnaire distributed using Google Forms. Before completing the questionnaire, respondents received information concerning the purpose of the study and their voluntary participation. Respondents' identities were kept confidential.

The number of respondents was determined according to the available population and the inclusion criteria used in the study. The final dataset consisted of 31 respondents and was used consistently in the analysis of financial behavior, level of need, and student expenditure.

2.3. Research Procedure

The research procedure consisted of three stages: preparation, implementation, and analysis.

a) Preparation Stage.
The preparation stage included identification of the research problem, literature review, development of the conceptual framework, preparation of the research instrument based on the indicators of each variable, and testing of instrument validity and reliability. The instrument was prepared to measure financial behavior, level of need, and student expenditure.

b) Implementation Stage.
The implementation stage involved distributing the questionnaire online through Google Forms to active students of the Mathematics Education Study Program who met the predetermined respondent criteria. The questionnaire responses were collected as primary data. The completeness of the responses was checked before the data were processed.

c) Analysis Stage.
The analysis stage consisted of data coding, data tabulation, descriptive statistical analysis, instrument validity and reliability testing, and multiple linear regression analysis. The regression analysis was used to examine the partial and simultaneous relationships of financial behavior and level of need with student expenditure.

2.4. Instruments and Data Collection

The research instrument was a questionnaire developed to measure three variables: financial behavior, level of need, and student expenditure. The questionnaire used a five-level Likert scale consisting of Strongly Disagree (STS), Disagree (TS), Neutral (N), Agree (S), and Strongly Agree (SS). The score for each respondent was obtained by summing the scores of all statement items for each variable.

The instrument was developed based on the indicators used to represent each research variable and was subjected to validity and reliability testing before being used for data collection. Validity testing was conducted to examine whether each statement item appropriately measured the intended construct, while reliability testing using Cronbach's Alpha was conducted to examine the internal consistency of the instrument. The original instrument criteria stated that a Cronbach's Alpha value greater than 0.60 indicated an acceptable level of reliability.

The questionnaire was distributed online through Google Forms, and the resulting data constituted primary data obtained directly from respondents' answers.

Numeracy literacy was not measured through a separate numeracy test or included as an independent variable in the statistical model. Instead, the financial behavior and spending decisions examined in this study were interpreted as contexts involving quantitative activities, including budgeting, prioritizing needs, comparing expenditure alternatives, estimating available resources, and controlling financial resources.

2.5. Data Analysis

Data analysis was conducted using IBM SPSS Statistics. Descriptive statistical analysis was first used to describe the characteristics and distribution of the three research variables. Instrument validity and reliability were then examined before inferential analysis was conducted. Multiple linear regression analysis was subsequently used to examine the relationships of financial behavior and level of need with student expenditure, both partially and simultaneously. Hypothesis testing consisted of the t-test, F-test, and coefficient of determination (R^2), with a significance level of 5% ($\alpha = 0.05$).

Before interpreting the multiple linear regression results, the regression assumptions were considered through residual normality, linearity, multicollinearity, and heteroscedasticity testing. These tests were included to assess whether the data met the assumptions required for multiple linear regression and to support the interpretation of the regression coefficients. The regression model was used because the research objective was to examine the partial and simultaneous relationships of two independent variables, financial behavior (X_1) and level of need (X_2), with student expenditure (Y).

3. Result and discussion

Data analysis was conducted using descriptive and inferential statistics. The research data were obtained from 31 students of the Mathematics Education Study Program, Alauddin State Islamic University, Makassar (N=31), who were selected using purposive sampling. The respondents were active students who met the research criteria and were willing to participate. The 31 respondents were used consistently for the analysis of financial behavior (X_1), level of need (X_2), and student expenditure (Y).

Each variable was measured using a five-level Likert scale consisting of Strongly Disagree (STS), Disagree (TS), Neutral (N), Agree (S), and Strongly Agree (SS). The score of each respondent was obtained from the total score of all statement items for each variable. The average value of each variable was calculated using the following formula:

$$\bar{X} = \frac{\sum X}{N}$$

Description:
$\bar{X}$ = Mean value;
$\sum X$ =The total number of Likert scores of all respondents on a variable;
N = Number of research respondents (31 students).

To determine the distribution of respondents in each category, the following percentage formula was used:

$$P = \frac{F}{N} \times 100\%$$

Description:
P = Presentae
F = Frequency of respondents in a given category
N = Number of research respondents (31 students).

Inferential analysis was conducted using validity testing, reliability testing with Cronbach's Alpha, multiple linear regression, t-test, F-test, and coefficient of determination (R^2), with a significance level of 5% (α=0.05). The regression analysis was used to examine the partial and simultaneous relationships of financial behavior and level of need with student expenditure.

Table 1. Summary of the Average Score of Each Variable

Yes	Variabel	Number of Respondents	Total Score	Average	Category
1	Financial Behavior	31	117,2	3,78	High
2	Level of need	31	113,2	3,65	High
3	Student expenditure	31	115,3	3,72	High

Based on the descriptive analysis of 31 respondents, all three research variables were classified as High. Financial behavior obtained an average score of 3.78, level of need obtained an average score of 3.65, and student expenditure obtained an average score of 3.72.

The category determination was based on the class interval of the five-level Likert scale. The class interval was calculated using the following formula:

$$P = \frac{Highest\ Score - Lowest\ Score}{Number\ of\ Categories}$$

The resulting category intervals were used to classify respondents into Very High, High, Medium, Low, and Very Low categories.

Table 2. Distribution of Financial Behavior Categories

Category	Score Interval	Frequency	Percentage
Very High	4,21 – 5,00	8	**25**, **8**%
Height	3,41 – 4,20	15	**48**, **4**%
Medium	2,61 – 3,40	6	**19**, **4**%
Low	1,81 – 2,60	2	**6**, **4**%
Very Low	1,00 – 1,80	0	**0**%

Table 2 shows that most respondents were in the High category of financial behavior, with 15 students (48.4%). This was followed by the Very High category with 8 students (25.8%), the Medium category with 6 students (19.4%), and the Low category with 2 students (6.4%). No respondents were classified in the Very Low category.

Table 3. Distribution of Level of Needs Categories

Category	Score Interval	Frequency	Percentage
Very High	4,21 – 5,00	7	22,6%
Height	3,41 – 4,20	14	45,2%
Medium	2,61 – 3,40	8	25,8%
Low	1,81 – 2,60	2	6,4%
Very Low	1,00 – 1,80	0	0%

Table 3 indicates that 14 respondents (45.2%) were classified in the High category for level of need. Furthermore, 8 respondents (25.8%) were in the Medium category, 7 respondents (22.6%) were in the Very High category, and 2 respondents (6.4%) were in the Low category. No respondents were classified in the Very Low category.

Table 4. Distribution of Student Expenditure Categories

Category	Score Interval	Frequency	Percentage
Very High	4,21 – 5,00	9	29,0%
Height	3,41 – 4,20	13	41,9%
Medium	2,61 – 3,40	7	22,6%
Low	1,81 – 2,60	2	6,5%
Very Low	1,00 – 1,80	0	0%

Table 4 shows that 13 respondents (41.9%) were in the High category of student expenditure. The Very High category consisted of 9 respondents (29.0%), the Medium category consisted of 7 respondents (22.6%), and the Low category consisted of 2 respondents (6.5%). No respondents were classified in the Very Low category.

3.1. Financial Behavior and Spending Decisions within Numeracy Contexts

The regression analysis indicates a relationship between financial behavior and student expenditure. Financial behavior concerns students' ability to plan, budget, control, and evaluate the use of financial resources. In everyday financial situations, these activities involve

quantitative processes such as estimating available resources, comparing expenditure alternatives, prioritizing needs, and monitoring spending.

The finding is consistent with research [13], which indicates that financial behavior contributes to effective financial management. This finding is also consistent with evidence from university students showing that financial literacy and financial attitudes are associated with financial behavior [20, 28]. Studies [23, 24] also report that financial behavior and spending may be associated with social environments, trends, and the convenience of digital transactions. These findings are relevant to the present study because financial behavior may influence how students allocate available resources among competing needs [12, 14, 15, 21, 22].

From a mathematics-education perspective, these activities constitute numeracy contexts, rather than evidence of numeracy ability itself [7]. Planning and controlling expenditure require students to estimate available resources, compare prices and priorities, interpret numerical financial information, and evaluate whether an expenditure is appropriate. The OECD financial literacy framework recognizes that many financial decisions require basic numerical operations and quantitative reasoning [42].

3.2. Need Level, Priority Setting, and Spending Decisions

The regression analysis indicates a positive relationship between level of need and student expenditure. Higher levels of need are associated with greater expenditure required to meet those needs [15, 16]. This finding is consistent with studies [22, 23], which indicate that increasing academic and non-academic needs can increase student spending, particularly when accompanied by lifestyle and social influences. Technological development and the convenience of digital transactions may also broaden the types of needs experienced by students [18, 24].

For Mathematics Education students, needs may include learning resources, stationery, internet access, and other study-related requirements. Prioritizing these needs requires students to compare available resources with expected costs and distinguish essential expenditure from non-essential expenditure. These processes can be interpreted as numeracy contexts because they involve quantitative judgments about affordability and priority. The statistical relationship remains between the measured variables of level of need and student expenditure; numeracy is used only as an interpretive context.

3.3. Combined Financial Behavior and Level of Need in Spending Decisions

The multiple linear regression analysis indicates that financial behavior and level of need jointly contribute to student expenditure among Mathematics Education students at UIN Alauddin Makassar. Financial behavior is related to how students manage available funds, while the level of need is related to the amount of expenditure required to meet identified needs [13, 14, 21, 22].

This finding is consistent with research [14], which shows that financial behavior contributes to the management of expenses according to financial needs and conditions. Research [13] also indicates that appropriate financial behavior contributes to more effective financial decision-making and planned fulfillment of needs. Similar evidence among students shows that financial literacy is associated with financial management behavior [6, 28].

The contribution of this study lies in examining financial behavior and level of need simultaneously in relation to student expenditure among Mathematics Education students and interpreting these financial decisions within numeracy contexts. Budgeting, comparison, prioritization, and resource allocation represent everyday situations in which quantitative reasoning is functionally applied. However, because numeracy was not measured as an independent construct, the findings do not demonstrate a statistical effect of numeracy literacy on financial behavior or student expenditure.

3.4. Overall Findings and Mathematics-Education Relevance

The descriptive results show that financial behavior, level of need, and student expenditure were all classified as High based on the category intervals used in this study. The mean scores were 3.78, 3.65, and 3.72, respectively. These values provide a descriptive profile of the respondents' financial behavior, needs, and expenditure.

Previous studies indicate that financial management factors contribute to spending behavior [27], while level of need and economic conditions are associated with student expenditure [15, 16, 29]. Research involving university students also indicates that financial literacy, social environment, and related financial factors are relevant to financial behavior [2, 6, 28].

3.5. Numeracy-Related Quantitative Profile of Financial Decision Contexts

The category distributions provide additional descriptive information concerning the financial decision contexts experienced by respondents. For financial behavior, 23 of 31 students (74.19%) were classified in the High or Very High categories. For level of need, 21 of 31 students (67.74%) were classified in the High or Very High categories, while 22 of 31 students (70.97%) were classified in the High or Very High categories for student expenditure.

These proportions indicate that most respondents were situated in the higher categories of the three measured financial variables. The associated financial situations involve quantitative judgments, including allocating limited funds, comparing needs and wants, estimating costs, prioritizing expenditures, and monitoring the relationship between available resources and spending.

Importantly, the percentages 74.19%, 67.74%, and 70.97% are not numeracy-literacy scores. The study did not administer a separate numeracy test, so these percentages cannot be interpreted as evidence of students' numeracy ability. Instead, they provide descriptive evidence that the financial behavior and spending decisions observed in this study occur in contexts that

require quantitative reasoning.

Accordingly, the mathematics-education relevance of the findings lies in identifying financial decision-making as an authentic context in which quantitative reasoning can be applied. The interpretation concerns the contextual use of numeracy, not a direct measurement or statistical effect of numeracy literacy.

4. Conclusion

This study examined the relationship of financial behavior and level of need with student expenditure among Mathematics Education students at UIN Alauddin Makassar. The descriptive results showed that financial behavior, level of need, and student expenditure were all classified as High, with mean scores of 3.78, 3.65, and 3.72, respectively. The inferential analysis examined the partial and simultaneous relationships of financial behavior and level of need with student expenditure. The findings indicate that financial behavior and level of need are relevant to students' spending decisions, with the level of need showing a more dominant contribution than financial behavior based on the regression results.

The contribution of this study lies in examining financial behavior and level of need simultaneously in relation to student expenditure among Mathematics Education students and interpreting these financial decisions within numeracy contexts. This context includes budgeting, comparing costs and alternatives, prioritizing needs, estimating available resources, and allocating limited funds. The study therefore provides a specific mathematics-education context for understanding how quantitative reasoning is involved in everyday financial decision-making.

However, numeracy literacy was not directly measured as a research variable in this study. Therefore, the findings concerning financial behavior, level of need, and student expenditure should not be interpreted as direct evidence of students' numeracy literacy. The numeracy perspective in this study is limited to interpreting the quantitative reasoning involved in the financial decision-making contexts identified in the research.

The practical implication is that financial decision-making contexts can be used to connect quantitative reasoning with students' everyday experiences. Mathematics Education programs may incorporate authentic financial situations involving budgeting, expenditure comparison, prioritization, and resource allocation into learning activities. Future research should involve larger and more representative samples and directly measure numeracy literacy using validated numeracy instruments if the objective is to examine its statistical relationship with financial behavior and spending decisions. Future studies may also examine other factors that potentially influence student expenditure.

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