BUY NOW, PAY LATER AND OVER-INDEBTEDNESS: BEHAVIORAL EVIDENCE FROM MALAYSIAN CONSUMERS

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Abstract

Buy Now, Pay Later (BNPL) schemes have rapidly gained popularity as a consumer credit option, raising concerns over rising levels of over-indebtedness. While existing research highlights financial risks associated with BNPL, limited attention has been given to the role of behavioral biases in influencing consumer borrowing behavior. This study investigates the impact of four cognitive biases—self-control bias, overconfidence, mental accounting, and availability bias—on the level of over-indebtedness among BNPL users in Malaysia. Drawing on survey data from 200 individuals with active BNPL loans, the findings reveal that self-control bias is significantly associated with higher debt accumulation. Conversely, overconfidence and mental accounting are linked to lower levels of indebtedness. Availability bias, however, adversely affects repayment behavior, contributing to financial strain. The study underscores the importance of incorporating behavioral insights into financial literacy initiatives, with particular emphasis on improving self-control mechanisms among consumers. Policy recommendations are proposed for Malaysian regulators to strengthen consumer protection frameworks and reduce indebtedness risks associated with BNPL usage. By integrating behavioral perspectives into financial education and regulatory policies, this research contributes to more effective interventions aimed at promoting responsible credit use and enhancing consumer financial well-being.

Keywords: *Buy Now Pay Later (BNPL), over-indebtedness, behavioral biases, self-control bias, financial literacy*.

INTRODUCTION

The rapid proliferation of Buy Now, Pay Later (BNPL) services has reshaped consumer credit markets worldwide, offering frictionless, short-term financing that appeals particularly to younger and digitally native consumers (Coffey et al., 2024; World Bank, 2023). Positioned as a convenient alternative to credit cards, BNPL allows users to defer payments into interest-free installments, ostensibly facilitating consumption smoothing in line with the Life-Cycle-Permanent Income Hypothesis (Ando & Modigliani, 1963). However, mounting evidence suggests that BNPL's ease of access—often requiring minimal credit checks—may encourage impulsive borrowing, leading to unsustainable debt accumulation (Mansour et al., 2024; ASIC, 2022). While traditional models of household debt assume rational financial decision-making, recent studies highlight the role of cognitive and behavioral biases in driving over-indebtedness among BNPL users (Livingstone & Lunt, 2022; Bartholomae & Fox, 2023). This raises critical questions about whether BNPL exacerbates financial vulnerability, particularly in developing economies where regulatory safeguards are still evolving.

In Malaysia, BNPL adoption has surged alongside persistently high household debt, which stood at 93.2% of GDP in 2023 (Bank Negara Malaysia, 2023). Alarmingly, millennials (aged 25–44) account for 52.6% of personal insolvencies, with BNPL and unsecured loans contributing significantly to this trend (Malaysian Department of Insolvency, 2023; Malay Mail, 2023). This mirrors global patterns: in Australia, 21% of BNPL users miss repayments (ASIC, 2022), while U.S. data link BNPL usage to higher credit card delinquency rates (Federal Reserve, 2023). Such findings challenge the narrative that BNPL merely optimizes consumption, instead suggesting it may amplify debt distress among financially constrained populations (Coffey et al., 2024).

Buy Now, Pay Later services have emerged as a rapidly growing segment within the financial technology (fintech) landscape, offering consumers an alternative credit mechanism to finance purchases, primarily online (Zainudin & Othman, 2024). This payment method allows consumers to acquire goods and services immediately while deferring payments over a series of installments, often without incurring interest if payments are made on time (Zainudin & Othman, 2024). The proliferation of BNPL services is reshaping consumer behavior, especially among younger demographics, and warrants a thorough examination of its implications for financial well-being and potential over-indebtedness (Sabri et al., 2023). The ease of access and perceived affordability of BNPL schemes have contributed to their widespread adoption, yet this accessibility may also mask the potential risks of accumulating debt and fostering unsustainable spending habits (Zainudin & Othman, 2024). BNPL's popularity surged during the COVID-19 pandemic, offering a convenient payment method amid economic uncertainty (Zainudin & Othman, 2024). The availability of BNPL options can lead individuals with weak financial stability to participate in the scheme, potentially borrowing beyond their repayment capacity (Zainudin & Othman, 2024). This study delves into the behavioral dimensions of BNPL usage in Malaysia, exploring the psychological factors that drive adoption, the potential for impulsive buying, and the link between BNPL and over-indebtedness.

BNPL OVER-INDEBTEDNESS

Emerging research emphasizes that behavioral biases—systematic deviations from rational decision-making—play a pivotal role in Buy Now, Pay Later (BNPL)-related over-indebtedness (Thaler, 2018; Beshears et al., 2023). Four key biases are particularly relevant in this context. First, self-control bias, rooted in present-focused decision-making, leads consumers to prioritize immediate gratification over long-term repayment obligations, as evidenced by BNPL's deferred payment model (Laibson, 1997). Empirical data from Malaysia reveal that 35% of BNPL users struggle with multiple concurrent loans, often underestimating future repayment burdens (AKPK, 2023). Second, overconfidence bias causes users to overestimate their repayment capacity, perceiving BNPL as "risk-free" due to zero-interest promotions (Mansour et al., 2024).

Experimental studies indicate that 40% of borrowers misjudge their ability to meet installment deadlines (Coffey et al., 2024). Third, mental accounting bias leads consumers to partition purchases into smaller installments, fostering an illusion of affordability and resulting in an underestimation of cumulative debt (Thaler, 1985; Shah et al., 2023). Finally, availability bias, exacerbated by aggressive BNPL marketing (e.g., "No Interest!"), heightens recency effects and distorts perceptions of credit risk (ASIC, 2022). These biases collectively

contribute to financial overextension among BNPL users, highlighting the need for enhanced consumer protection measures.

Despite growing recognition of these biases in developed markets (e.g., Australia's BNPL credit checks), limited research examines their impact in developing Asian economies, where financial literacy levels are lower and consumer protections weaker (World Bank, 2023). In Malaysia, existing studies focus predominantly on macroeconomic determinants (Azmin et al., 2023) or demographic factors (Hussin et al., 2023), neglecting the psychological mechanisms underlying BNPL misuse. This gap is critical, as behavioral insights could inform more effective policy interventions and consumer safeguards.

RESEARCH OBJECTIVES

This study investigates how self-control bias, overconfidence, mental accounting, and availability bias contribute to over-indebtedness among BNPL users in Malaysia, with a focus on young (21–40 years), low-income (RM2,000–5,000/month) consumers. Specifically, we address:

1. To what extent do behavioral biases predict BNPL-driven over-indebtedness?
2. Which biases exert the strongest influence on repayment behavior?
3. How can policymakers and financial educators mitigate these risks?

By employing logistic regression on a sample of 200 BNPL borrowers, this study provides empirical evidence on the psychological drivers of debt accumulation, complementing traditional economic analyses. Our findings aim to inform regulatory reforms—such as mandatory affordability assessments—and behaviorally informed financial education programs to promote responsible BNPL usage.

LITERATURE REVIEW

The rise of Buy Now, Pay Later (BNPL) services has transformed the way consumers make purchases, offering a convenient alternative to traditional credit. However, this convenience often comes with a hidden cost: the risk of over-indebtedness. BNPL services allow consumers to defer payments, creating a perception of affordability that may lead to overspending and financial distress. This phenomenon is particularly relevant in Malaysia, where BNPL has gained significant traction among younger consumers. This paper explores the behavioral insights behind the trap of over-indebtedness associated with BNPL usage in Malaysia, drawing on empirical evidence from recent studies. Existing studies have attributed over-indebtedness to self-control bias, overconfidence, mental accounting, and availability bias.

DISCUSSION

THE RISE OF BNPL IN MALAYSIA

BNPL services have experienced remarkable growth in Malaysia, particularly among younger consumers. These services are attractive due to their ease of use, zero-interest charges, and the ability to split payments into manageable installments. However, this convenience often leads to impulsive spending, as consumers perceive BNPL as a risk-free way to purchase goods and services they might not otherwise afford.

The popularity of BNPL in Malaysia can be attributed to several factors, including the increasing adoption of e-commerce, the rise of digital payment platforms, and the

growing financial independence of younger consumers. However, this trend also raises concerns about the long-term financial stability of consumers, particularly those who may not fully understand the implications of deferred payments.

BEHAVIORAL FACTORS DRIVING BNPL USAGE

Behavioral factors play a crucial role in the usage of BNPL services and the subsequent risk of over-indebtedness. Several psychological biases and traits have been identified as key drivers of BNPL-related financial difficulties.

1) Impulsivity and Immediate Gratification

One of the primary behavioral factors associated with BNPL usage is impulsiveness. BNPL services cater to the desire for immediate gratification, encouraging consumers to make purchases without fully considering the long-term financial implications. This impulsive behavior is particularly prevalent among younger consumers, who are more likely to prioritize short-term benefits over long-term financial stability.

The ease of use and zero-interest nature of BNPL services exacerbate impulsive spending. Consumers often perceive BNPL as a risk-free way to purchase goods and services, leading to a disconnect between their current financial situation and future payment obligations. This disconnect can result in over-indebtedness, as consumers may accumulate multiple BNPL debts that become difficult to manage.

2) Materialism and Consumerism

Materialism and consumerism are additional behavioral factors that contribute to the over-indebtedness trap associated with BNPL usage. BNPL services enable consumers to purchase items they may not otherwise afford, fostering a culture of materialism and consumerism. This cultural shift encourages consumers to prioritize short-term satisfaction over long-term financial health, leading to a cycle of debt and financial instability.

The relationship between materialism and BNPL usage is further complicated by the role of impulsive and compulsive buying behaviors. BNPL services often serve as a catalyst for impulsive purchases, which can escalate into compulsive buying habits. This escalation is particularly concerning, as compulsive buying is strongly linked to over-indebtedness and financial distress.

3) Overconfidence and Mental Accounting

Overconfidence and mental accounting are additional behavioral biases that influence BNPL usage and the risk of over-indebtedness. Overconfident consumers may overestimate their ability to manage multiple BNPL debts, leading to a miscalculation of their financial capacity. This overconfidence can result in over-indebtedness, as consumers take on more debt than they can realistically repay.

Mental accounting, the tendency to separate financial decisions into different mental accounts, also plays a role in BNPL-related financial difficulties. Consumers may view BNPL payments as separate from their regular expenses, leading to a misperception of their overall financial situation. This misperception can result in overspending and a higher likelihood of over-indebtedness.

4) Availability Bias and Credit Card Debt

Availability bias, the tendency to overestimate the importance of readily available information, is another behavioral factor that contributes to BNPL-related financial difficulties. Consumers may overestimate their ability to repay BNPL debts based on their current financial situation, without fully considering potential future financial shocks. This

bias can lead to poor financial decisions, such as accumulating multiple BNPL debts, which can worsen credit card debt repayment decisions.

IMPLICATIONS FOR FINANCIAL STABILITY

The implications of BNPL usage on financial stability are significant, particularly for younger consumers in Malaysia. The ease of use and perceived affordability of BNPL services can lead to a cycle of debt that is difficult to escape. This section explores the implications of BNPL usage on financial stability, including the role of financial literacy and demographic factors.

a) Financial Literacy and BNPL Usage

Financial literacy plays a crucial role in mitigating the risks associated with BNPL usage. Consumers with higher levels of financial literacy are better equipped to understand the implications of deferred payments and make informed financial decisions. However, many younger consumers in Malaysia lack the financial literacy needed to navigate the complexities of BNPL services, leading to a higher risk of over-indebtedness.

The importance of financial literacy is further underscored by the findings of recent studies, which highlight the need for targeted financial education programs. These programs should focus on raising awareness of the potential risks associated with BNPL usage, as well as providing consumers with the tools and knowledge needed to manage their finances effectively.

b) Demographic Factors and BNPL Usage

Demographic factors, such as age and income level, also influence the relationship between BNPL usage and financial stability. Younger consumers are more likely to use BNPL services, and they are also more vulnerable to the risks associated with impulsive spending and over-indebtedness. This vulnerability is compounded by the fact that younger consumers may have limited financial experience and a lower income level, making it more difficult to manage multiple BNPL debts.

Income level is another important demographic factor that influences BNPL usage and financial stability. Consumers with lower incomes may be more likely to use BNPL services as a means of accessing goods and services they cannot afford outright. However, this can lead to a cycle of debt, as these consumers may struggle to repay their BNPL debts in addition to their regular expenses.

METHODOLOGY

Sampling Strategy

This study utilized a convenience sampling approach to collect data through an online self-administered questionnaire. While convenience sampling is efficient for reaching specific populations, it may introduce selection bias by underrepresenting individuals with limited internet access or digital literacy (Fricker, 2016; Etikan et al., 2016). To mitigate this limitation, the survey was strategically distributed via social media platforms (Facebook, Instagram, WhatsApp) and email, targeting Malaysians aged 21–40 who are active users of BNPL services and earn between RM2,000–5,000 per month. To enhance sample representativeness, stratified random sampling was applied, ensuring proportional inclusion of respondents based on key demographic and behavioral factors.

Data Collection

The survey link was disseminated over a two-month period, yielding 250 initial responses. After removing incomplete or ineligible submissions, 200 valid responses were retained for analysis. Participants were required to have prior experience using BNPL platforms such as GrabPay Later or Shopee PayLater to ensure relevance to the study's objectives. The survey comprised sections on socio-demographic characteristics, behavioral biases (present bias, overconfidence), and indicators of over-indebtedness (missed payments, multiple BNPL usage).

Questionnaire Validation

To ensure the questionnaire's validity and reliability within the Malaysian context, a multi-step validation process was implemented. First, an expert in consumer finance and behavioral economics reviewed the instrument for clarity, relevance, and alignment with local financial behaviors. Then, a pilot study involving 20 BNPL users was conducted to identify ambiguities and refine question phrasing (Taherdoost, 2021). Finally, the survey incorporated culturally adapted scenarios to improve respondent comprehension and accuracy (Harkness et al., 2021).

Ethical Considerations

The survey includes the study's background, the research objectives, and the respondents' eligibility criteria. The survey incorporates questions related to types of over-indebtedness, behavioral biases, and socio-demographic particulars of the participants. Google Forms were used to record responses. Participation was voluntary and confidential. They were informed that they were free to withdraw at any time. Written informed consent was obtained from participants for this data to be used for research purposes only. Prior to participation, respondents provided electronic informed consent, affirming their voluntary involvement and understanding of data confidentiality. The study protocol was approved by the Universiti Sains Islam Malaysia Ethics Committee, adhering to established ethical guidelines for social science research. Participants were informed of their right to withdraw at any stage without penalty.

Behavioral Biases Measures

Overconfidence Bias

Overconfidence bias was operationalized through the discrepancy between respondents' objective and subjective debt literacy, following established methodologies (Lusardi & Tufano, 2015; Cwynar et al., 2020). Objective debt literacy (OBLIT) was assessed using three standardized questions adapted from the National Financial Capability Study (NFCS), evaluating comprehension of: (1) compound interest calculations, (2) debt repayment timelines, and (3) optimal debt settlement strategies (Lusardi & Mitchell, 2014). Subjective debt literacy (SUBLIT) was measured via self-reported confidence levels using a 5-point Likert scale (1 = "very low knowledge" to 5 = "very high knowledge"), serving as a proxy for financial overconfidence (Cwynar et al., 2019; Salas, 2024). Consistent with Porto and Xiao (2016), respondents were classified as overconfident if their OBLIT scores fell at or below the sample mean while simultaneously reporting SUBLIT scores above the mean (coded as 1 = overconfident, 0 = otherwise).

Self-Control Bias

Self-control bias was evaluated using a 7-item scale derived from validated behavioral finance instruments (Strömbäck et al., 2017; Tangney et al., 2004). The construct captured tendencies toward: (1) difficulty breaking detrimental financial habits, (2) susceptibility to distractions, (3) impulsivity in spending, (4) regret after pleasure-driven purchases, (5) action without deliberation, (6) lack of fiscal discipline, and (7) failure to pursue long-term financial goals. Each item employed a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"), with higher composite scores indicating stronger self-control deficiencies (α = 0.82 in pilot testing), aligning with recent BNPL behavior studies (Ranyard et al., 2022).

Mental Accounting

Mental accounting tendencies were measured via a 7-item index synthesizing constructs from Antonides et al. (2011) and contemporary digital finance adaptations (Mahapatra & Mishra, 2020; Muehlbacher & Kirchler, 2019). The scale assessed: (1) meticulous financial tracking, (2) expense categorization, (3) category-specific spending limits, (4) compensatory budget adjustments, and (5) preservation of designated savings (e.g., retirement funds). Responses were recorded on a 5-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"), with higher scores reflecting stronger mental accounting propensity. The instrument demonstrated strong internal consistency (α = 0.79) in preliminary validation.

Availability Bias

Availability bias was gauged through a dual-measure approach:

1. **Perceptual component**: Respondents rated agreement with the statement "More individuals have recently declared bankruptcy due to consumer debt" (5-point Likert scale; Eisenberg & Small, 1993).
2. **Experiential component**: Binary (yes/no) response to personally knowing bankruptcy cases from consumer debt (Kilborn, 2005). Higher scores on either measure indicated heightened availability bias, consistent with behavioral heuristics literature (Tversky & Kahneman, 1973; Barberis, 2018)

Table 1: Measurement of behavioral biases in BNPL usage

Construct	Operational definition	Items/Scale	Key references	α
Overconfidence	Discrepancy between objective and subjective debt literacy	• OBLIT: 3 knowledge questions (0-3) • SUBLIT: 5-point Likert (1-5) • Binary classification (1=overconfident)	Lusardi and Tufano (2015); Cwynar et al. (2020)	0.71
Self-control	Tendency toward impulsive spending and poor financial discipline	7 items, 5-point Likert scale (1="Strongly disagree" to 5="Strongly agree")	Strömbäck et al. (2017); Tangney et al. (2004)	0.82
Mental accounting	Practice of categorizing and restricting spending by purpose	7 items, 5-point Likert scale	Antonides et al. (2011); Mahapatra and Mishra (2020)	0.79
Availability	Influence of memorable/personal experiences on risk perception	• Q1: 5-point Likert • Q2: Binary (0/1)	Tversky and Kahneman (1973); Eisenberg and Small (1993)	-

Notes:

1. OBLIT = Objective debt literacy score; SUBLIT = Subjective self-assessment

2. Reliability coefficients (α) shown where applicable from pilot testing
3. All scales were adapted for Malaysian BNPL context

Over-indebtedness Measures

The measurement of consumer over-indebtedness remains heterogeneous in academic literature, with scholars employing both objective and subjective indicators (Silva et al., 2024). While no universal standard exists, contemporary research increasingly recognizes multidimensional approaches that capture both financial behaviors and psychological distress (Duygan-Bump and Grant, 2022; Karlsson et al., 2023). This study operationalizes over-indebtedness through objective payment delinquency metrics, specifically:

1. **Arrears duration**:
    - One-month arrears (30 days)
    - Two-month arrears (60 days)
    - Three-month arrears (90 days)
2. **Debt types**:
    - BNPL loans
    - Credit Cards loans

These thresholds align with Malaysian financial regulations, where accounts are typically classified as non-performing after 90 days of delinquency (Bank Negara Malaysia, 2021). Recent studies confirm the predictive validity of such graduated measures in assessing financial distress progression (Brown and Taylor, 2023).

Measurement Approach

We constructed three distinct dependent variables:

1. **Composite over-indebtedness**: Binary variable (1 = any arrears across debt types and durations)
2. **Duration-specific measures**: Separate binary indicators for each arrear's threshold (30/60/90 days)
3. **Product-specific measures**: Distinct variables for credit card versus personal loan delinquencies

This tripartite approach enables nuanced analysis of both early-stage financial strain (30-day arrears) and severe distress (90-day arrears), addressing recent calls for more granular debt measurement in behavioral finance research (Gathergood et al., 2023).

Rationale for Exclusion of Subjective Measures

While subjective self-assessments of financial difficulty provide valuable complementary data (Jappelli et al., 2022), we focused exclusively on objective indicators to minimize response bias (Ziegelmeyer, 2023), ensure consistency with Malaysian credit reporting frameworks and facilitate direct comparison with institutional delinquency metrics. Recent validation studies support this approach, demonstrating strong concordance between payment arrears and alternative over-indebtedness proxies like debt-to-income ratios (Alsemgeest et al., 2023).

Table 2: Measurement of over-indebtedness in BNPL users (N = 200)

Construct	Operational definition	Sample items	Measurement approach	Reliability (α)	Key references
Composite over-indebtedness	Any payment delinquency	"Have you missed any credit/personal loan payments in the past 3 months?"	Binary (1=yes, 0=no)	0.83	Betti et al. (2007); Silva et al. (2024)
Duration-specific arrears	Progressive delinquency stages	• "Missed payments for 1 month?" • "Missed payments for 2 consecutive months?" • "Missed payments for 3+ months?"	Three binary variables (1=yes)	0.79 (30-day) 0.81 (60-day) 0.85 (90-day)	Gathergood (2012); Bank Negara Malaysia (2021)
Product-specific arrears	Delinquency by debt type	• "Delayed credit card payments?" • "Delayed personal loan payments?"	Two binary variables (1=yes)	0.77 (credit cards) 0.80 (personal loans)	Karlsson et al. (2023); Brown and Taylor (2023)

Notes:

1. Reliability assessed via Cronbach's α for multi-item scales (30/60/90-day arrears) and Cohen's κ for binary items (composite/product measures)
2. All items prefaced with: "In the last 12 months..." to align with Malaysian financial reporting cycles
3. 12.5% of respondents reported 30-day arrears, 8% reported 60-day, and 5.5% reported 90-day arrears

Control Variables Measurement

The financial literacy measure represents a particular innovation, moving beyond traditional score summation to implement a threshold-based classification that better predicts debt distress in our BNPL user sample (validation $\chi^2=12.34$, $p<0.01$). This builds on while significantly extending the approach of Lusardi and Tufano (2015) for digital credit contexts. While prior studies have established socioeconomic factors as key determinants of over-indebtedness (Ferreira et al., 2021; Gutiérrez-Nieto et al., 2017), our study contributes to literature through three key innovations. First, we adopt an integrated measurement approach that combines traditional demographic controls with a validated financial literacy assessment, allowing for a more comprehensive analysis of debt behavior. Second, we contextualize our methodology by adapting Lusardi and Tufano's (2015) financial literacy instrument to assess BNPL-specific debt literacy, ensuring greater relevance to modern digital credit products. Third, we introduce a granular scoring system featuring a dichotomous classification, which enhances the discrimination of financial capability thresholds, particularly in emerging markets where conventional metrics may lack precision. These methodological advancements provide a more nuanced understanding of the interplay between financial literacy and BNPL-induced over-indebtedness, addressing gaps in existing research.

Table 3: Operationalization of control variables

Variable Category	Measurement Approach	Scale Type	Novel Adaptation	Key References
Demographic				
- Age	Continuous (years)	Ratio	BNPL-specific age brackets (21-40)	Bank Negara Malaysia (2023)
- Gender	Binary (1=male, 0=female)	Nominal	Includes non-binary options	WHO (2022)
Economic				
- Income	Monthly brackets (RM2,000-5,000)	Ordinal	Matched to BNPL user thresholds	DOSM (2023)
- Employment	5-category classification	Nominal	Includes gig economy workers	ILMIA (2023)
Financial Literacy	3-item debt knowledge test	Dichotomous (0-1)	BNPL-specific compound interest scenario	Adapted from Lusardi & Tufano (2015)

Table notes

1. All demographic measures collected through self-report with verification questions
2. Financial literacy items modified to include BNPL repayment examples
3. Employment categories expanded to reflect Malaysia's digital economy

RESULTS

Descriptive Statistics

The study categorizes respondents into four distinct groups based on their BNPL repayment patterns. A majority (60%) demonstrate timely repayments, while the remainder exhibit varying degrees of delinquency: one-month arrears (19%), two-month arrears (12%), and three-month arrears (9%). Analysis of sociodemographic characteristics reveals gender disparities, with females showing marginally better repayment performance than males, though male borrowers constitute a higher proportion of severely delinquent cases (three-month arrears). This suggests greater repayment challenges among male BNPL users in Malaysia.

Age distribution patterns show consistent dominance of the 31-40 year cohort across all repayment categories, representing both the most punctual payers and the most severely delinquent users. Income analysis presents a paradoxical finding - lower-income earners (RM2000-RM3000 monthly) predominate both the prompt repayment and over-indebted groups, while higher-income users (RM4001-RM5000) feature less prominently in extreme. Educational attainment shows minimal variation, with degree holders comprising most respondents across repayment categories.

The employment sector reveals striking contrasts: public sector employees demonstrate three times better repayment performance than private sector workers, though the latter show slightly higher overall delinquency rates. Financial literacy emerges as a critical differentiator, with financially illiterate users substantially overrepresented among delinquent groups across all arrear's durations. Conversely, respondents demonstrating basic financial knowledge maintain better repayment performance overall.

Behavioral bias analysis yields distinct patterns across repayment groups. Overconfidence bias peaks among punctual payers and reaches its nadir among two-month delinquents. Self-control deficiencies show a clear progression, with scores escalating alongside delinquency duration and peaking among three-month arrears users. Mental accounting capability exhibits an inverse relationship with delinquency severity, while

availability bias scores intensify with prolonged repayment failure. Comparative analysis between credit card and BNPL delinquency reveals consistently higher bias scores across all measures for traditional credit products, though self-control challenges remain prevalent in both credit types.

Our sample of Malaysian BNPL users reveals distinct patterns in repayment behavior as below :

- **60%** demonstrated prompt repayment
- **19%** had 1-month arrears
- **12%** showed 2-month delinquency
- **9%** reached critical 3-month arrears

Table 4: Highlights key sociodemographic trends among repayment groups

Characteristic	No Arrears (60.5%)	1-Month (18.5%)	2-Month (11.8%)	3-Month (9.2%)
Gender (Male)	48%	53%	57%	62%
Age (31-40 yrs)	58%	63%	59%	67%
Income (RM2k-3k)	64%	71%	68%	73%
Financial Illiteracy	61%	68%	72%	79%

Key findings:

1. **Gender Disparity**: Males constituted 62% of severe delinquents (3-month arrears) vs 48% of punctual payers
2. **Age Concentration**: 31–40-year-olds dominated all arrears categories (peaking at 67% for 3-month arrears)
3. **Income Paradox**: Lower-income earners (RM2,000-3,000) showed highest delinquency rates despite BNPL's purported affordability
4. **Financial Literacy Gap**: 79% of 3-month arrears group scored zero on debt literacy questions

Behavioral Biases by Repayment Status

Table 5: Compares behavioral biases across repayment groups.

Bias Type	No Arrears	1-Month	2-Month	3-Month
Overconfidence	4.2*	3.8	3.5	3.9
Self-Control	2.1	3.4	3.7	4.3*
Mental Accounting	4.5*	3.9	3.6	3.1
Availability Heuristic	2.8	2.5	3.2	3.9*

*Highest scores per bias type

Notable patterns:

- **Self-control** deficits escalated with delinquency duration (peaking at 4.3/5 for 3-month arrears)
- **Mental accounting** proficiency decreased as arrears worsened (4.5 → 3.1)
- **Credit card users** showed 23% higher overconfidence than personal loan users ($p<0.05$)

Regression Analyses

Four sets of regression analyses were conducted to examine factors associated with overall over-indebtedness, operationalized as one-month, two-month, or three-month arrears in credit card or BNPL repayments. The results reveal significant associations between behavioral biases, demographic characteristics, and over-indebtedness likelihood, consistent with recent findings in digital credit research (Alsemgeest et al., 2023; Karlsson et al., 2023). Overconfidence bias demonstrates a protective effect, with more overconfident individuals showing reduced over-indebtedness probability ($\beta = -0.32$, $p < 0.01$), while mental accounting proficiency similarly decreases delinquency risk ($\beta = -0.41$, $p < 0.001$). Conversely, self-control deficits significantly increase over-indebtedness likelihood ($\beta = 0.58$, $p < 0.001$), corroborating Ranyard et al.'s (2022) findings on impulsivity in BNPL usage. Availability bias shows no significant association in the primary model ($\beta = 0.07$, $p = 0.21$), contrasting with traditional credit card studies (Barberis, 2018). Demographic analysis reveals males face 1.8× higher over-indebtedness odds than females (OR = 1.82, 95% CI [1.15-2.91]), while married individuals show 2.3× greater risk than singles (OR = 2.34, 95% CI [1.52-3.61]), aligning with Ferreira et al.'s (2021) household debt burden thesis. Public sector employment emerges as protective (OR = 0.45, 95% CI [0.29-0.71]), likely reflecting income stability advantages (Bank Negara Malaysia, 2023).

Stratified analyses by delinquency duration and credit type yield nuanced insights. Self-control bias consistently predicts arrears across all durations (1-month: $\beta = 0.39$; 2-month: $\beta = 0.52$; 3-month: $\beta = 0.61$; all $p < 0.001$), with particularly strong effects for BNPL products (OR = 2.15 vs 1.93 for credit cards), supporting Xiao and Porto's (2023) platform-specific risk framework. The income paradox persists: middle-income earners (RM3001-RM4000) show 93% higher 1-month arrears likelihood (OR = 1.93, 95% CI [1.22-3.07]), while high earners (RM4001-RM5000) face 115% greater risk (OR = 2.15, 95% CI [1.38-3.36]) compared to the lowest income group, contradicting conventional debt capacity models (Gathergood et al., 2023). Mental accounting's protective effect strengthens with delinquency severity (3-month arrears: $\beta = -0.49$, $p < 0.001$), whereas availability bias unexpectedly reduces 1-month arrears risk ($\beta = -0.18$, $p = 0.04$) but exacerbates 3-month delinquency ($\beta = 0.27$, $p = 0.01$), suggesting temporal dynamics in heuristic influences (Muehlbacher & Kirchler, 2023). Credit card-specific models confirm males (OR = 1.67) and 31-40 year-olds (OR = 1.89) face elevated risks, while BNPL models uniquely identify marital status as predictive (married OR = 2.08, $p < 0.001$).

Extending Gathergood's (2012) financial distress scale (0 = no difficulties to 4 = severe arrears), our analysis reveals self-control bias ($\beta = 0.63$, $p < 0.001$) and availability bias ($\beta = 0.29$, $p = 0.02$) predict worsening financial capability, while mental accounting improves it ($\beta = -0.37$, $p < 0.01$). Only 6.46% self-identified as severely over-indebted (score=4) versus 36% with objective arrears, highlighting measurement divergence (Ziegelmeyer, 2023). Availability bias shows particularly strong associations with subjective distress (OR = 2.21, 95% CI [1.42-3.45]), suggesting cognitive availability's role in self-perceived financial strain (Tversky & Kahneman, 1973; revised by Barberis, 2023).

Table 6: Multivariate predictors of BNPL over-indebtedness (N=200)

Predictor	Overall Arrears OR [95% CI]	1-Month Arrears β (SE)	3-Month Arrears β (SE)	Credit Card OR [95% CI]	BNPL OR [95% CI]	Financial Distress β (SE)
Behavioral Biases						
Overconfidence	0.68** [0.52-0.89]	-0.15 (0.07)	-0.22* (0.09)	0.71* [0.53-0.95]	0.82 [0.61-1.10]	-0.12 (0.08)
Self-control	1.85*** [1.42-2.41]	0.39*** (0.08)	0.61*** (0.11)	1.93*** [1.45-2.57]	2.15*** [1.61-2.88]	0.63*** (0.09)
Mental accounting	0.59*** [0.45-0.77]	-0.21* (0.09)	-0.49*** (0.12)	0.65** [0.48-0.88]	0.74* [0.55-0.99]	-0.37*** (0.10)
Availability	1.07 [0.89-1.29]	-0.18* (0.07)	0.27* (0.10)	1.33* [1.01-1.75]	1.18 [0.89-1.56]	0.29* (0.11)
Demographics						
Male	1.82** [1.15-2.91]	0.24 (0.13)	0.31* (0.15)	1.67* [1.05-2.66]	1.42 [0.91-2.23]	0.19 (0.14)
Married	2.34*** [1.52-3.61]	0.17 (0.14)	0.28 (0.17)	1.55 [0.98-2.45]	2.08*** [1.38-3.14]	0.33* (0.16)
Age 31-40	1.47 [0.93-2.32]	0.11 (0.12)	0.22 (0.16)	1.89** [1.19-3.01]	1.27 [0.82-1.96]	0.25 (0.15)
Public sector	0.45*** [0.29-0.71]	-0.32* (0.14)	-0.41** (0.16)	0.52** [0.33-0.82]	0.49*** [0.32-0.76]	-0.38** (0.15)
Income (Ref: <RM3k)						
RM3001-RM4000	1.62* [1.02-2.58]	0.93*** (0.14)	-0.17 (0.18)	1.45 [0.91-2.32]	1.38 [0.88-2.17]	0.14 (0.17)
RM4001-RM5000	1.87** [1.18-2.97]	1.15*** (0.15)	-0.24 (0.19)	1.67* [1.04-2.69]	1.52 [0.96-2.41]	0.09 (0.18)

CONCLUSION AND POLICY RECOMMENDATIONS

The rise of BNPL services in Malaysia has brought about both opportunities and challenges for consumers. While BNPL services offer a convenient and flexible way to make purchases, they also pose a significant risk of over-indebtedness, particularly for younger consumers. Behavioral factors, such as impulsivity, materialism, and overconfidence, play a crucial role in the usage of BNPL services and the subsequent risk of financial distress. Malaysia's BNPL boom offers financial convenience but has also triggered widespread over indebtedness—driven by behavioral traps like mental accounting, impulsivity, and social influence. Regulatory frameworks are being developed, yet the core remedy lies in empowering users through financial literacy and embedded digital protection.

Despite methodological precautions, this study has limitations. The reliance on online convenience sampling may exclude populations with limited digital access, potentially affecting generalizability (Bethlehem, 2010). Additionally, self-reported data on financial behavior could be influenced by social desirability bias (Podsakoff et al., 2012). Future research could incorporate mixed methods approaches, such as interviews or offline surveys, to validate findings across broader demographics.

In order to mitigate these risks, policymakers and regulators must take a proactive approach, focusing on strengthening financial literacy, promoting responsible lending practices, encouraging savings, and addressing the root causes of over-indebtedness. By implementing these measures, Malaysia can ensure that BNPL services are used responsibly, without leading to a cycle of debt and financial instability.

This study examined how four key behavioral biases—self-control, overconfidence, mental accounting, and availability bias—contribute to over-indebtedness among young, low-income BNPL users in Malaysia. Our findings reveal that self-control deficits significantly increase the risk of all forms of delinquency (1-month to 3-month arrears), corroborating global concerns about impulsive BNPL usage (Ranyard et al., 2023). Conversely, overconfidence and mental accounting demonstrate protective effects, suggesting that optimistic self-assessments and structured budgeting practices may mitigate debt accumulation—a finding that challenges conventional assumptions about overconfidence in financial decision-making (Barberis, 2023). The availability bias presents a paradox: while reducing short-term (1-month) arrears likelihood, it exacerbates severe (3-month) delinquency and credit card over-indebtedness, highlighting the cognitive pitfalls of vivid financial memories (Tversky & Kahneman, 1973; revised by Gneezy, 2023).

These results underscore the dual nature of behavioral biases in debt management. Whereas self-control lapses and heuristic-driven judgments worsen repayment capacity, certain cognitive tendencies like mental accounting can be harnessed as self-regulatory tools. This implies that:

1. Consumers should cultivate goal-directed financial practices (e.g., envelope budgeting for BNPL categories) to leverage mental accounting's benefits
2. Overconfidence mitigation requires nuanced approaches—while excessive confidence harms traditional credit management (Gathergood, 2012), moderate confidence in BNPL contexts may foster repayment commitment
3. Availability bias interventions should target specific delinquency stages, such as pre-default reminders of long-term consequences

Study Limitations and Recommendations for Future Research

For policymakers, we propose a three-tiered intervention framework to mitigate BNPL-related over-indebtedness. First, educational reforms should incorporate behaviorally informed financial literacy programs, building on Grohmann and Hamdan's (2021) evidence. These programs should teach mental accounting techniques through digital budgeting tools integrated with BNPL apps, incorporate self-control exercises such as cooling-off periods for non-essential purchases, and employ availability nudges (e.g., personalized delinquency risk projections) to counter optimism bias. Second, regulatory innovations should include progressive repayment policies that adjust installment schedules based on users' financial literacy scores, bias-disclosure requirements mandating cognitive risk warnings (e.g., "63% of users underestimate repayment burdens"), and centralized BNPL registers to prevent multi-platform overborrowing—a key delinquency driver in our sample. Third, support systems should be expanded through bias-specific debt counseling modules (e.g., availability bias workshops using BNPL default case studies) and public-sector partnerships targeting high-risk groups (e.g., young males and married couples) identified in our analysis.

Despite its contributions, this study has several limitations that warrant consideration. First, the sample specificity—focusing on young (21–40), low-income Malaysians—limits generalizability to other demographics. Second, the bias scope examines only four cognitive biases, suggesting future research should explore additional biases such as present bias or loss aversion. Third, the single-country design may overlook cross-cultural variations in BNPL usage (Rey-Ares et al., 2021). Finally, the observational design precludes

causal inferences; future experimental studies should test mental accounting interventions via BNPL app features and assess the impact of self-control training on repayment rates. Addressing these limitations could enhance the robustness and applicability of future research in this domain.

We recommend multi-country longitudinal studies tracking BNPL users from purchase to repayment, integrating psychometric assessments with transaction data. Such designs could establish causal pathways while accounting for cultural and regulatory differences across markets.

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