

Financial Scarcity, Cognitive Load, Financial Stress, and Household Economic Decision-Making: Experimental Evidence from Urban Ghana

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Abstract

Payday-related liquidity fluctuations may influence household financial decisions through cognitive demands and financial stress. This study examines differences between interviews conducted before and after salary payment among 1,000 lower-paid workers in five Ghanaian metropolitan areas. The field survey combined cognitive tasks, financial-stress measures and incentivised intertemporal and risk-choice tasks. Group comparisons and regression estimates relate payday timing to savings, financial stress, cognitive performance and household planning. In the controlled specifications, the before-payday indicator was associated with lower savings (coefficient -0.531), lower Raven task scores (-0.721), higher financial stress (0.409) and a lower household decision-making index (-0.171). Risk-preference differences were not statistically clear. Contrary to the proposed mediation account, the supplied bootstrap results did not identify significant indirect effects through cognitive load or financial stress: both confidence intervals include zero. These findings point to possible short-term financial pressure around payday, but the evidence should be interpreted cautiously because assignment procedures require verification and some supplied summary statistics are inconsistent. The study contributes Ghanaian evidence on the distinction between financial strain, cognitive measures and observed choices, while identifying the need for better-powered and transparently documented causal designs.

JEL Classification: C83, D14, D81, D91, I31

Keywords: Financial Scarcity; Payday Timing; Cognitive Performance; Financial Stress; Household Decision-Making

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INTRODUCTION

Payday cycles create predictable changes in the resources available to wage-dependent households. Costs arise throughout the month, but income is often concentrated around salary dates. For low-paid workers, this mismatch can increase financial strain and potentially affect attention, planning and intertemporal choices. Understanding these patterns matters for urban households whose access to savings and informal support may be limited (Carvalho et al., 2016; de Bruijn & Antonides, 2022). Scarcity has two related meanings in economics. Robbins (1932) framed economic choices as allocating limited means among competing ends. Mullainathan and Shafir (2013) developed a behavioural account in which scarcity-related concerns can capture attention and reduce the mental resources available for other tasks. These propositions are not equivalent: constrained budgets need not produce measurable cognitive impairment in every setting. Empirical studies offer different results. Mani et al. (2013) found evidence of cognitive consequences of poverty-related concerns, whereas Carvalho et al. (2016) found payday differences in some monetary choices but not in their cognition and general decision-quality measures. Recent reviews caution against treating these relationships as universal (de Bruijn & Antonides, 2022).

Financial stress may respond to a temporary shortage even when measurable risk preferences remain unchanged. Psychological strain and cognitive-task performance are also distinct outcomes: one cannot infer that a change in a stress score caused a change in financial decision quality. Research on workers' financial concerns and productivity highlights the value of distinguishing attention-related mechanisms from liquidity itself (Kaur et al., 2025). The present study therefore considers the financial situation, psychological outcomes and experimental choices separately before examining possible indirect associations. This paper studies low-paid urban workers in Accra, Kumasi, Sekondi-Takoradi, Cape Coast and Tamale. It compares respondents interviewed immediately before payday with those interviewed shortly afterward. The contribution is to examine savings, short-run finances, cognitive performance, perceived financial stress and incentivised choices within one Ghanaian field study. The analysis does not establish that salary timing was randomly assigned by the researchers, and causal language is therefore limited to what the observed design supports. A central empirical tension concerns whether scarcity changes preferences or the ability to implement them. While the scarcity account predicts increased attentional demands, studies have not found consistent changes in measured risk aversion. Carvalho et al. (2016) report a difference in monetary intertemporal choices around payday but not in risk-taking or their overall decision-quality measures. de Bruijn and Antonides (2022) review evidence on scarcity and decision-making and emphasise differences in measurement, context and mechanisms. This study tests whether the Ghanaian patterns are concentrated in liquidity, stress, cognition or choices rather than assuming all outcomes must move together. The pathways considered are financial pressure, cognitive demands and financial stress. Each may coincide with difficulty planning, but contemporaneously measured mediators do not themselves establish causal pathways. Differences between groups may also reflect employer payroll schedules, job characteristics and household expenditures. Regression adjustments reduce observed compositional differences without ruling out unmeasured determinants.

The empirical question is whether before-payday respondents differ from after-payday respondents on financial and behavioural outcomes and whether stress and cognitive measures account statistically for any observed decision-making gap. We compare the main estimates with measures of risk attitudes and the available indirect-effect tests. The findings are presented with the limitations of the timing design and the supplied dataset summaries made explicit. The article proceeds as follows. Section 2 describes the sample, field tasks and variable

definitions. Section 3 sets out the conceptual framework and empirical approach. Section 4 reports financial, cognitive and behavioural results, including tests of potential mediation. Section 5 discusses their implications, limitations and priorities for future research.

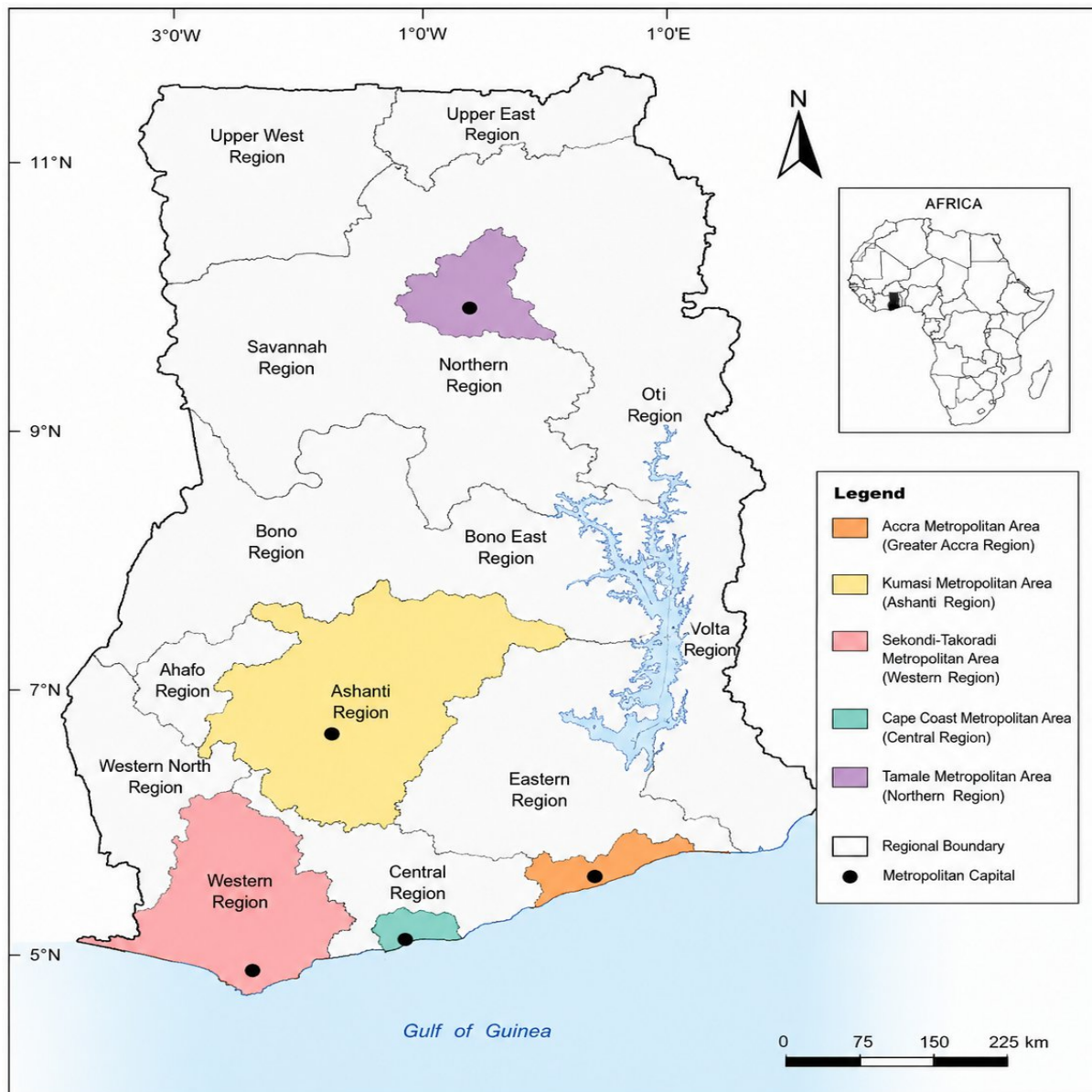


Figure 1: Geographic Distribution of Selected Metropolitan Areas in Ghana.

The figure below presents the five metropolitan areas selected for this study: The Accra Metropolitan Area located in Greater Accra, Kumasi Metropolitan Area found in the Ashanti region, Sekondi-Takoradi Metropolitan Area situated in the western part of the country, Cape Coast Metropolitan Area located in the central region, and Tamale Metropolitan Area in the northern part of Ghana. These metropolises represent the most developed economic centers in the country that differ in terms of employment opportunities, cost of living, social issues, and other factors. The research covers a large span of ecological and administrative regions, which makes the final results more relevant and applicable to a broad range of population groups facing financial problems, cognitive load issues, financial stress, and economic decision-making challenges.

Source: Ghana Statistical Service (2022), Survey and Mapping Division.

EXPERIMENTAL DESIGN, SETTING AND SAMPLE

Study Setting

Accra Metropolitan Area (Greater Accra Region), Kumasi Metropolitan Area (Ashanti Region), Sekondi-Takoradi Metropolitan Area (Western Region), Cape Coast Metropolitan Area (Central region), and Tamale Metropolitan Area (Northern region) are the five metro regions selected for this study. The choice fell on these areas because they account for most of the formal and informal workers in Ghana and can be considered the most developed urban clusters in the country. Those locations have a specific impact on the study's representativity and generalizability. The selected metro regions are the significant economic centers characterized by a high concentration of enterprises of various types, including transport, telecommunications, education, health, finance, hotels, small-scale manufacturing, and trading activities.

More than fifty percent of Ghanaians already live in urban areas, and more than half of them are employed in urban centers, according to the 2021 Population and Housing Census (Ghana Statistical Service, 2022). Thus, a considerable number of workers in the selected metro regions experience a continuous lack of cash despite numerous job opportunities. Urban dwellers typically have fewer alternative income sources than their rural counterparts, making their incomes highly dependent on regular employment. Salaries constitute the primary source of income for families living in urban areas, while farm products or networks of relatives are typical for households in rural regions. For those working for somebody else, compensation is typically provided on a regular, monthly basis, while expenditures such as rent or mortgage payments, food, transportation, recreation, education, medical bills, and debt servicing are incurred throughout the month. Therefore, the disposable income of cash-dependent workers tends to be seasonal and varies throughout the month, peaking right after being paid and gradually declining until the next salary. Such a pattern is a perfect basis for understanding how the perceived financial deprivation may interfere with day-to-day household management, economic decision-making, and cognitive performance. The study will benefit from the diversity of enterprises presented in the selected regions. Apart from private organizations, public institutions, educational establishments, hospitals, banks, shops, transport modes, accommodation, and unofficial enterprises could be found in the study areas (Ghana Statistical Service, 2022). Thus, the study will generate relevant insights for urban Ghanaians with low-level occupations since the sample will include respondents from various employment sectors and types of enterprises.

Experimental Design and Sample Selection

The study utilizes a behavioral field experimental design that exploits the anticipated change in households' liquidity at the monthly salary cycle. As suggested by Carvalho, Meier, and Wang (2016), the study compares respondents interviewed right before getting their salary with others interviewed right after payday to understand financial scarcity. The study design ensures a high level of ecological validity by relying on actual variations in the level of liquidity rather than inducing variations artificially. Structured personal interviews were conducted between March and May 2026. Conducting face-to-face interviews at the respondents' places of work increases the response rate while minimizing interference with the participants' routines. At the same time, no more than three respondents were selected from any given organization to reduce clustering problems caused by having too many respondents from the same company. The study adopts a multi-stage sampling procedure. In the first step, five metropolitan areas with a large number of low-wage urban workers were selected. In the second

step, directories, local government data, and professional networks were used to identify businesses in the selected metro regions. Finally, in the third step, eligible employees were identified based on inclusion criteria. For the purpose of the study, a household member refers to an individual who shared living space and made joint decisions in the preceding 6 months.

Several inclusion criteria were used to select respondents. First, the respondent had to be employed on a permanent or contractual basis and must have received monthly wages at least once. The monthly wage/salary of the respondent is not expected to exceed one thousand Ghanaian Cedi (GHS1000). The one thousand Ghanaian Cedis (GHS1000) is an arbitrary figure chosen because the mean household size in Ghana is about 3.6 (Ghana Statistical Service, 2021) and the poverty line is about \$2.15 (approximately GHS25.80) per person per day. Second, the monthly wage had to constitute at least fifty percent (50%) of the respondent's household income meaning that the salary defined the primary source of income for the respondent. Third, the respondent had to be from the low-income group as defined by the distribution of wage distributions in Ghana. Fourth, respondents had to be 18 years old and above and have some say in making household financial decisions either on an individual or collective basis. Finally, we expected respondents to have some knowledge about how to manage the financial resources of their households. The sample size was determined using a power analysis that considered the major assumptions of the study. In most cases, the target sample size for experimental and behavioral economics studies assumes a power between 0.75 and 0.8. For this study, we assumed a power of 0.8 and a statistical significance level of 5%. Further, we assumed that the effect size was moderate and consistent with earlier research on the financial behavior of agents facing temporary scarcity (Carvalho et al., 2016). Using the statistical software Stata, the command `power twomeans` suggested that the minimum sample size needed for the experiment was 400. Although 400 was the minimum number of respondents needed for the experiment, we chose to use 1000 respondents to increase the precision of our estimates. First, a sample size of 1000 would provide sufficient data to analyze mediating and moderating factors of interest. Second, it would enable us to carry out heterogeneous treatment analysis with more confidence. Third, we would also be able to detect variations between different socio-economic groups. Lastly, a sample of this size was adequate to analyze the complex relationships between different variables.

The sampling was done in different stages. First, we identified organizations in the selected metropolitan regions and developed a master list of all eligible employees. As such, the initial sampling frame contained 1,462 employees who met all the initial eligibility criteria. Further, those employees who agreed to be part of the study and participate in the baseline survey comprised the baseline sample for the study. From the baseline sample, we selected respondents to form two experimental groups using stratified sampling. The stratification was done according to the respondent's region, occupation, organization size, and gender. Finally, the two experimental groups each comprised 500 respondents for a total of 1000 respondents. The first experimental group was asked to complete the second survey one to five days before their monthly salary was due as a way of capturing the effect of temporary financial scarcity. The second group completed the second survey five days after they cleared their monthly salary to capture the alleviation of financial scarcity. As a general rule, for the experimental groups, the second survey was always done before the end of the month to ensure the two groups were relatively close to each other in time. This study adopted the experimental design pioneered by Carvalho et al. (2016), but with the difference that the study covers multiple regions within Ghana. In other words, the study's design relies on a within-subjects' comparison of the financial situation of workers before and after payday. The date of the second survey was determined by the date of salary clearance as determined by the respective organization and not by the researchers. As such, the study's treatment timing was entirely exogenous to the

respondents' decisions. The study's attrition rate was less than 5%, with more than 95% of all respondents completing the two rounds of the survey. In other words, the final data set had sufficient data to answer the study's research questions.

Baseline Survey and Data Collection

The baseline survey sought to capture information on socio-economic, demographic, employment, and socio-economic characteristics of respondents. The baseline information was used to ensure that the two experimental groups were comparable on baseline characteristics and control for other factors affecting the decision-making capacity of the employees. The baseline characteristics that were collected included the respondent's age, gender, education level, marital status, household size, religion, and employment status. Besides these characteristics, the baseline survey collected the respondent's monthly income, years of experience, saving behavior, and debt levels. Additionally, the percentage of the respondent's income from their employment and their financial literacy were captured. Employer characteristics such as ownership, industry, size, and number of employees were also captured. Collecting the employment status of the respondents was essential in controlling organizational factors that might affect the psychological state and behavior of the employees. The follow-up survey collected information on the key outcome variables. The baseline information was used to ascertain the level of financial scarcity stress among the respondents. Likewise, information on cognitive load and financial scarcity was collected. Raven's progressive matrices (RPM) measured cognitive load, while the study used psychometric instruments in behavioral finance and psychology to measure financial scarcity. On the other hand, the study used a combination of incentivized behavioral experiments and questionnaires to capture information on household decision-making. The questions captured information on saving behavior, borrowing, consumption function, expenditure priorities, risk-taking, and intertemporal preferences.

Enumerator Training and Survey Implementation

The baseline and follow-up surveys were conducted by twenty professional enumerators and five field coordinators. The survey enumerators underwent training on the study's objectives, ethical considerations, behavioral experiments, questionnaire administration, and supervisory skills. The training covered several aspects, including respondent recruitment, maintaining professional conduct during the interaction, minimizing interview bias, and ensuring uniform implementation of surveys and behavioral tasks. The survey questionnaire was pilot tested by a subset of low-skilled urban workers who were not selected to participate in the study. The pilot study helped the researchers identify questions and instructions that could be misunderstood or responded to incorrectly. The feedback was used to improve the clarity of the survey questions and tasks. The final set of questions was uploaded into Survey Solutions software for digital data collection. The data collection process had in-built features that allowed data validation or rejection at a glance, additional checks for skipped fields, and encrypted storage of the results.

Besides training and piloting, the study had a daily data quality monitoring process. The data monitoring aimed to identify data collection problems and directions where the field enumerators may need assistance during data collection. Consequently, field supervisors reviewed all daily data entries to check for inconsistencies and missing information before new interviews commenced. Lastly, Table 1 below shows the balancing test results between the before-payday and after-payday groups based on the baseline characteristics. Overall, the balancing test results indicate that the study did not identify statistically significant differences

between the two groups for most of the baseline characteristics used in the analysis. As a result, the random selection of the sample was successful, as the control and treatment groups were comparable in most demographics and employment-related factors.

Table 1: Balance Check (Baseline) Before-payday and after-payday groups based on the study dataset

Variable	Before Group	After Group	p-value
Age	28.80 (8.5246)	28.93 (9.0186)	0.8861
Sex (female=1)	0.4684 (0.5003)	0.4462 (0.4984)	0.6620
Educational Level			
No Education	0.0053 (0.0725)	0.0103 (0.1010)	0.5771
Primary Education	0.0421 (0.2013)	0.0308 (0.1731)	0.5545
Junior High Education	0.2526 (0.4357)	0.1949 (0.3971)	0.1751
Secondary Education	0.6158 (0.4877)	0.6923 (0.4627)	0.1153
Tertiary Education	0.0842 (0.2784)	0.0718 (0.2588)	0.6509
Ethnicity			
Akan	0.4895 (0.5012)	0.4872 (0.5011)	0.9642
Dangme	0.0211 (0.1439)	0.0462 (0.2104)	0.1718
Ga	0.1947 (0.3970)	0.2154 (0.4121)	0.6169
Ewe	0.1579 (0.3656)	0.1026 (0.3042)	0.1078
Frafra/Talensi	0.0263 (0.1605)	0.0359 (0.1851)	0.5890
Other ethnic groups	0.1105 (0.3144)	0.1128 (0.3172)	0.9432
Religion			
Christian	0.9000 (0.3008)	0.9231 (0.2672)	0.4270
Muslim	0.0895 (0.2862)	0.0615 (0.2409)	0.3014
Traditional	0.0053 (0.0725)	0.0050 (0.0716)	0.9854
Marital Status			

Married	0.1526 (0.3606)	0.1692 (0.3759)	0.6586
Consensual Union	0.0947 (0.2936)	0.0615 (0.2409)	0.2267
Divorce	0.0263 (0.1604)	0.0205 (0.1421)	0.7077
Single	0.7105 (0.4540)	0.7487 (0.4363)	0.4004
Respondent's relationship to household head			
Household (HH) head	0.7000 (0.4595)	0.7436 (0.4378)	0.3411
Spouse of HH head	0.0789 (0.2704)	0.0462 (0.2104)	0.1842
Child of HH head	0.1474 (0.3554)	0.1590 (0.3666)	0.7527
Employment Status			
Permanent worker	0.7737 (0.4196)	0.7744 (0.4191)	0.9874
Temporary worker	0.1105 (0.3144)	0.1078 (0.3109)	0.9292
Casual worker	0.1158 (0.3208)	0.1128 (0.3172)	0.9273
Months at current job (IHS)	3.6249 (1.3528)	3.5651 (1.3056)	0.6594
Income sources: Wage only	0.7526 (0.4262)	0.7436 (0.4378)	0.8386
Income sources: Wage & remittance	0.1526 (0.3606)	0.1436 (0.3516)	0.8034
February Salary (GHS)	637.884 (202.768)	631.969 (189.793)	0.7677
Other family members work (=1)	0.4316 (0.4966)	0.4667 (0.5002)	0.4902
HH size	2.8105 (2.3312)	2.6667 (2.0450)	0.5206
No. of times other HH member receives salary	1.3425 (0.9162)	1.3889 (0.9576)	0.7659
% respondent income to HH income	78.4474 (21.5984)	76.9692 (21.2949)	0.4993
Business ownership: Family	0.0579 (0.2342)	0.0462 (0.2104)	0.6049
Business ownership:	0.03684	0.0359	0.9606

Government	(0.1889)	(0.1863)	
Business ownership: Private	0.9053 (0.2936)	0.9077 (0.2902)	0.9350
No. employees (IHS)	1.9906 (0.9735)	2.1009 (1.0928)	0.2968
Location: AMA	0.4000 (0.4912)	0.3949 (0.4901)	0.9184
KMA	0.0105 (0.1023)	0.0256 (0.1585)	0.2683
CCMA	0.2263 (0.4196)	0.1795 (0.3847)	0.2542
STMA	0.2316 (0.4230)	0.2769 (0.4486)	0.3084
TMA	0.0737 (0.2619)	0.0615 (0.2409)	0.6360
Number of observations	500	500	
Drink alcohol or smoke (=1)	0.1263 (0.3331)	0.1641 (0.3713)	0.2936

*Note: Means and standard deviations are reported in parentheses. *Exchange rate: 1 USD = GHS12 as of March 2023. Values are means with standard deviations in parentheses. For categorical variables, means represent proportions. P-values are based on Welch two-sample t-tests comparing before-payday and after-payday respondents. The analysis uses 1000 respondents from the uploaded dataset, with 500 respondents in each group.*

Experimental Design

Behavioural Experimental Tasks and Cognitive Measurement

To assess the treatment effect of temporary financial scarcity on household economic behaviour, this study implemented a set of incentivised behavioural experiments in a field survey. Specifically, this study used a combination of behavioural economic and cognitive psychological measures to evaluate whether temporary financial scarcity affected inter-temporal choices, cognitive ability, financial stress, and the overall quality of economic decision-making. The design of the behavioural experiment follows the approach of Andreoni and Sprenger (2012) and was later adopted and modified by Carvalho, Meier, and Wang (2016) and Giné et al. (2018) in similar experimental settings. This study implemented the tasks within the bounds of a field survey where individual respondents were interviewed face-to-face in their places of work by trained enumerators. Each respondent completed the behavioural tasks individually to avoid interactions that could affect responses. Additionally, before completing the task respondents were informed that they would receive payment if any of the respondent's decisions were selected randomly and that payment would be transferred electronically after the experiment. Using money as an incentive reduced hypothetical response bias and increased the likelihood of observing true preferences (Harrison & Rutström, 2008). This study used the modified version of the convex time budget task introduced by Andreoni and Sprenger (2012) to measure time preferences, present bias, and the consistency of inter-temporal economic decisions. In the experiment, each respondent was provided with a hypothetical experimental endowment of GHC100 that needed to be distributed between the payment intervals.

Each respondent had to make 12 independent allocation decisions with different combinations of temporal distribution of payments and experimentally given interest rates. For each allocation decision, respondents decided on the division of the experimental budget between the immediate (“sooner payment”) and delayed (“later payment”) cash-flow streams. For each decision, respondents had six options to allocate the budget from GHC0 to GHC100 in GHC20 increments for the “sooner payment” with the remaining share of the budget allocated to the “later payment.” Later payments were associated with experimentally given ex-post interest rates 0, 5, 7, and 10 percent depending on the choice options. Before making each decision, the respondents were briefed on the details of the choice set and the amount they would receive if they selected any of the option sets. After completing the allocation task, respondents were informed that one of their allocation decisions would be randomly selected and paid out as per the choice option and the corresponding interest rate applied. The payout would then be transferred electronically to the respondent’s mobile money account. As such, each respondent completed twelve inter-temporal allocation decisions resulting in each respondent’s choice observation and 12,000 observations from the 1,000 respondents. The large sample size allowed flexibility in analysing individual variations in time preferences while maintaining substantial statistical power to observe differences in the decision-making process between respondents subjected to treatment and those in the control group. The convex time budget experiment allowed assessing the quality of economic decision-making because, according to the law of demand, an increase in the interest rate on the “later payment” would incentivize more allocation to the “later payment” option. Following Giné et al. (2018) and Carvalho et al. (2016), this study used the convex time budget task to examine the consistency of inter-temporal choices by observing how the allocation to the “later payment” changed as the interest rate on “later payment” increased. Specifically, for each respondent, the 12 allocation decisions resulted in 9 pairwise decision comparisons where respondents decided on the allocation to the “later payment” given different combinations of interest rates on the “later payment.” Each respondent’s decision was classified as consistent if they increased the allocation to the “later payment” when the interest rate on the “later payment” also increased and vice versa. In cases where a respondent decreased the allocation to the “later payment” despite an increase in the interest rate on the “later payment,” the decision was classified as inconsistent. The number of inconsistent choices reflected the degree to which the respondent was able to process the information provided in the convex time budget allocation task. Unlike in Giné et al. (2018) and Carvalho et al. (2016), where the main focus was on time preferences, this study argued that temporary financial scarcity caused a decrease in the ability to process information reflected in greater inconsistency in inter-temporal choices. As such, the respondent’s inconsistent choices were used as a measure of cognitive processing in response to temporary financial scarcity.

This study used the Standard Progressive Matrices (SPM) developed by Raven (2000) to measure cognitive ability. SPM is one of the most widely used and validated non-verbal cognitive ability tests used in behavioural economic experiments and development economics literature ((Mani et al., 2013; Carvalho et al., 2016)). The test consisted of a series of multiple-choice questions with increasing difficulty levels. Each question had a matrix of abstract images with one image missing, and the respondent had to choose the option that best completes the matrix from the list of answer options provided. The respondent’s performance on the SPM test was measured by the number of correct answers provided. This study used the SPM test to measure fluid intelligence, which is a critical aspect of cognitive ability that drives performance in economic decision-making tasks. In addition to measuring cognitive ability, this study used a set of validated psychological measures to assess respondents’ financial stress. In particular, using a multi-item psychological scale, this study measured the financial stress

experienced by respondents. The financial stress scale captures the financial anxiety, difficulty making monthly payments, and the financial insecurity experienced by respondents. Acknowledging the effect of financial scarcity on psychological wellbeing, this study operationalized financial stress as the perception of difficulty in fulfilling financial obligations and the feeling of financial instability due to insufficient income. Using cognitive psychological measures alongside incentivised behavioural tasks was one of the methodological innovations of this study. Unlike in previous literature where cognitive ability or inter-temporal preferences were often measured separately, this study integrated the two measures to assess the impact of temporary financial scarcity on household economic behaviour. In particular, this study used an innovative approach to utilize inconsistencies in inter-temporal choices as a measure of cognitive processing to understand how temporary financial scarcity affected cognitive ability, financial stress, and household economic decision-making. As such, this study makes an important contribution to the literature on financial scarcity, economic decision-making, and financial behaviour in low-income populations.

Table 1 describes observed baseline characteristics by interview group. Reported differences are generally small, but a set of insignificant univariate comparisons does not prove that treatment timing was random or that unobserved characteristics were balanced. The use of employer-specific pay dates and possible workplace clustering limits causal interpretation. The sample and balance-test calculations should be reproduced from respondent-level records before publication.

Regarding employment, the majority of respondents were permanent workers with only a small proportion of respondents being on temporary or casual contracts. Most respondents had extensive work experience with relatively few respondents entering the labour market recently. Furthermore, most respondents identified their primary source of income as wages with only a small proportion receiving any form of remittances or other income. On average, respondents' monthly income was similar across the two experimental groups with most of the respondents contributing to the majority of household income. Lastly, almost one-half of the respondents had additional household members with income, and most households only had one or two income earners. Considering the majority of respondents were permanent workers with extensive work experience, it could be stated that the majority were relatively experienced in the labour market. Although the majority of respondents were the household head or a spouse, most households had additional income earners. As such, the personal characteristics and employment profile of the sample used in this study were appropriate for the research questions examined in this study. Turning to the employer characteristics, the majority of respondents were employed in private sector organisations with only a small proportion of respondents being employed in government and family-owned businesses. The majority of organisations had a relatively large employee base, while some were small-scale enterprises. There was also considerable diversity in the location of employment as respondents were employed in central business district, industrial areas, and markets throughout the study areas. As such, the employer characteristics of the sample were also appropriate for the study, as it reflected the diversity of urban employers in Ghana. Overall, the personal characteristics of the respondents showed that most of them were young, highly-educated males with extensive work experience, and were the head of the household in small households. In terms of employment, the respondents were predominantly permanent workers employed in private sector organisations with substantial employee bases located across a variety of commercial areas. Lastly, in terms of the baseline balance test, the differences between the experimental groups were minimal suggesting that the characteristics used in the analysis were distributed similarly across the respondent groups.

Table 2: Intertemporal Choices (Convex Time Budget)

There are 12 choices. In each choice, respondents were given an experimental budget of GHS100. The payment dates and the interest rate for the later payment differed across choices. Respondents allocated the experimental budget between the sooner and later payment periods. After the experiment, one of the 12 choices was randomly selected for actual payment.

Choice	Sooner (1st Payment)	Later (2nd Payment)	Interest Rate	X=0	X=20	X=40	X=60	X=80	X=100
Choice #1	2 weeks	6 weeks	0%	(0, 100)	(20, 80)	(40, 60)	(60, 40)	(80, 20)	(100, 0)
Choice #2	2 weeks	6 weeks	5%	(0, 105)	(20, 84)	(40, 63)	(60, 42)	(80, 21)	(100, 0)
Choice #3	2 weeks	6 weeks	7%	(0, 107)	(20, 86)	(40, 64)	(60, 43)	(80, 21)	(100, 0)
Choice #4	2 weeks	6 weeks	10%	(0, 110)	(20, 88)	(40, 66)	(60, 44)	(80, 22)	(100, 0)
Choice #5	2 weeks	4 weeks	0%	(0, 100)	(20, 80)	(40, 60)	(60, 40)	(80, 20)	(100, 0)
Choice #6	2 weeks	4 weeks	5%	(0, 105)	(20, 84)	(40, 63)	(60, 42)	(80, 21)	(100, 0)
Choice #7	2 weeks	4 weeks	7%	(0, 107)	(20, 86)	(40, 64)	(60, 43)	(80, 21)	(100, 0)
Choice #8	2 weeks	4 weeks	10%	(0, 110)	(20, 88)	(40, 66)	(60, 44)	(80, 22)	(100, 0)
Choice #9	Today	2 weeks	0%	(0, 100)	(20, 80)	(40, 60)	(60, 40)	(80, 20)	(100, 0)
Choice #10	Today	2 weeks	5%	(0, 105)	(20, 84)	(40, 63)	(60, 42)	(80, 21)	(100, 0)
Choice #11	Today	2 weeks	7%	(0, 107)	(20, 86)	(40, 64)	(60, 43)	(80, 21)	(100, 0)
Choice #12	Today	2 weeks	10%	(0, 110)	(20, 88)	(40, 66)	(60, 44)	(80, 22)	(100, 0)

Note: Each cell reports (X, Y), where X is the amount allocated to the sooner payment and Y is the amount payable at the later date after applying the experimental interest rate.

Table 3: Descriptive Statistics of Experimental Outcome Variables

Outcome Variable	Before Group	After Group	p-value
Sooner payments (GHS) (Intertemporal Choices 1-12) [*]	33.840 (32.128)	46.450 (34.357)	0.0000
Total inconsistency Intertemporal Choices (quality of decision making)	3.082 (1.085)	3.362 (1.036)	0.0000
Risk Averse Coefficient (Midpoint)	0.345	0.354	0.7194

	(0.407)	(0.413)	
High Risk Averse (Lottery Choice 1=1, otherwise=0)	0.344 (0.476)	0.370 (0.483)	0.3914
High-to-Moderate Risk Averse (Lottery Choices 1, 2, and 3=1, otherwise=0)	0.608 (0.489)	0.608 (0.489)	1.0000
Low Risk Averse (Lottery Choice 6=1, otherwise=0)	0.210 (0.408)	0.200 (0.400)	0.6957
Number of observations	500	500	
Number of observations [*]	6000	6000	

Note: Means and standard deviations are reported in parentheses. The respondent-level outcomes use 1,000 observations. Outcomes marked [] are based on respondent-choice level CTB data, with each respondent completing 12 choices, yielding 12,000 observations.*

Table 3 reports group means for intertemporal choices and risk preferences. The inconsistency measure warrants particular caution because the available aggregated results cannot be reconciled with an associated frequency summary. The findings on that measure should be checked against the respondent-level choices before drawing substantive conclusions. Differences in measured risk preferences are not statistically clear.

Risk Preference Measurement

To test whether temporary financial scarcity affects people's willingness to take financial risks, an incentivised risk preference experiment common in behavioural economics was conducted. The design of the experiment was adapted from Carvalho et al. (2016), building upon the lottery-choice design of Eckela and Grossman (2002). The main rationale for using such a design was that it allows eliciting respondents' risk preferences in a way that minimizes hypothetical nature of choices and, therefore, increases behavioural validity (Harrison & Rutström, 2008). In general, the design is based on the idea that people differ in their willingness to accept lower expected payoff in exchange for higher payoff variability. However, unlike common in the literature, the design does not rely on respondents' risk preferences over potential losses because losses lead to negative payoffs which, especially in the case of low-income respondents, are undesirable. Instead, respondents' risk preferences are defined by the expected payoff variability with fully positive payoffs, with the expected payoff being positively correlated with the variability.

Firstly, all respondents who participated in the experiment were paid GHS50 for their time and effort with an assurance that this sum of money is theirs. As is common for similar experiments, respondents were encouraged to treat the money as their own to avoid excessively risky choices when money is not perceived as one's own (Eckela & Grossman, 2002). In particular, there is a well-documented phenomenon in behavioural economics that risk preferences can differ depending on whether the money is given to the respondent or if the respondent is given the opportunity to earn the money. After receiving the participation payment, the respondents were asked to choose between six pairs of lotteries with different levels of expected payouts and payoff variability. Each option offered a 50% chance to gain either a Lower or Higher amount of money depending on the outcome of a computer-generated coin toss which was revealed to respondents after they made their choice. Prior to choosing, the respondents were briefed on the nature of the experiment and explained the potential outcomes in detail. In particular, the enumerators went through the description of each lottery choice and answered respondents'

questions before the experiment to ensure that the respondents understand what potential outcomes mean.

The expected payoff increased with the level of variability, and respondents who chose lotteries with relatively lower variability were identified as more risk averse while the ones who opted for lotteries with higher variability were more risk tolerant. Since the lottery choice leads to real outcomes, respondents' choices reflect their real preferences rather than stated preferences. To quantify respondents' risk preferences, the study used the Constant Relative Risk Aversion (CRRA) utility function to estimate the CRRA coefficient for each respondent's choice. In general, the CRRA is a popular parameter in behavioural economics because it allows for measuring deviation from the expected utility theory and, therefore, helps assessing the degree of risk aversion. Specifically, a lower CRRA coefficient indicates a higher willingness to accept risk. In addition, to measure the difference in risk tolerance between respondents interviewed before payday and respondents interviewed after payday, three categorical measures of risk aversion were constructed. First, a high-risk-aversion dummy was constructed as a dummy variable which was equal to one if a respondent chose the safest lottery (Choice 1) and zero otherwise. Second, a high-to-moderate risk-aversion dummy was constructed as a dummy variable which was equal to one if a respondent chose any of the first three lotteries (Choices 1-3) and zero otherwise. Finally, a low-risk-aversion dummy was constructed as a dummy variable which was equal to one if a respondent chose any of the four riskiest lotteries (Choices 4-6) and zero otherwise. Using these three dummies, an analysis can be carried out to see whether people interviewed before payday differ from those interviewed after payday in their risk aversion.

The key question the risk experiment seeks to answer is whether temporary financial scarcity affects people's willingness to take financial risk. In particular, a possible scenario is that respondents interviewed before payday are either more risk averse because impending payday reduces their capacity to take risks or less risk averse because, in an attempt to improve their current financial situation, respondents are willing to take on more risk than usual. Thus, the risk experiment allows for testing whether the financial burden respondents carry prior to payday impacts their permanent attitudes towards risk. If the analysis reveals that the attitudes towards risk differ between respondents interviewed before and after payday, this could mean that temporary financial scarcity leads to permanent changes in risk tolerance. However, if the analysis fails to reveal such differences, it will show that financial burden only affects people's cognitive capacity and financial stress but not their fundamental attitudes towards risk. This is an important distinction because in the case of the latter scenario, poor decision-making choices on the part of respondents before payday are explained by their cognitive state rather than their permanent risk preferences. Therefore, the risk experiment provides a valuable insight into the potential mechanism which links temporary financial scarcity to people's financial decisions.

As can be seen from Table 3, the descriptive statistics for the risk preference variables are very similar across respondents interviewed before payday and respondents interviewed after payday. This pattern holds true regardless of risk aversion measures used: the mean CRRA coefficient, the share of respondents who chose the safest lottery (high-risk-aversion dummy) and the share of respondents who chose the first three lotteries (high-to-moderate risk-aversion dummy) are very similar across the two groups of respondents. The mean values fall within a narrow range suggesting that respondents' risk preferences did not differ much, if at all, across respondents interviewed before payday and respondents interviewed after payday. This hypothesis is supported by the results of the hypothesis tests which failed to reject the null hypothesis of equal means across respondents interviewed before payday and respondents

interviewed after payday. Thus, the analysis of risk preferences failed to detect any significant differences between the two groups of respondents.

Table 4 Risk Choice Task

You will receive GHS50 as compensation for your participation in this behavioural experiment. You will be asked to use this participation payment to play a lottery-choice game designed to capture your risk preferences. The table below contains six lotteries. Each lottery has a 50% chance of paying out either a Higher amount or a Lower amount depending on the outcome of a coin toss. The outcome of the toss will be revealed to you after you make your choice. Choose only one option (1-6). One respondent's choice will be selected for implementation to ensure that all respondents are paid according to their choices.

Lottery Choice	Head (50%)	Tail (50%)	Select
1	GHS50	GHS50	☐
2	GHS65	GHS40	☐
3	GHS80	GHS30	☐
4	GHS95	GHS20	☐
5	GHS110	GHS10	☐
6	GHS125	GHS0	☐

Source: Study field-survey data and estimates (2026).

Note: Higher-numbered lotteries offer higher expected returns but greater payoff variability. Respondents selecting Lottery 1 are classified as highly risk averse, whereas those selecting Lotteries 4–6 are classified as relatively less risk averse. The realised payoff is determined by a random coin toss immediately after the respondent's choice.

Cognitive Function and Mental Health Measures

An essential objective of the study is to establish whether temporary financial scarcity lowers individuals' cognitive function and mental health, thus constraining their capacity to make optimal economic decisions. In behavioral economics literature, the adverse impact of financial scarcity on cognitive function has been theorized as a mechanism through which limited resources may constrain a household's decision-making capacity (Mani et al., 2013; Mullainathan & Shafir, 2013). This study experimentally tests some of these theoretical predictions by examining whether a negative shock to respondents' financial status influences their cognitive capacity and psychological wellbeing.

Cognitive Function Measurement

The current study utilizes the Raven's Standard Progressive Matrices (SPM) as a commonly adopted standardized cognitive test used in numerous economics experiments and research fields (Raven, 2000; Mani et al., 2013; Bruns, Dalleimer, & Musshoff, 2021). The Raven Progressive Matrices test measures fluid intelligence or reasoning ability, which refers to the ability to identify logical patterns and solve novel problems. SPM is a reliable cognitive ability test since it is independent of respondents' language proficiency and level of formal education, thus serving as a suitable methodology for analyzing the impact of financial scarcity on cognitive ability among respondents with different levels of literacy (Raven, 2000; Mani et al., 2013; Bruns et al., 2021). The original set of Raven Progressive Matrices contains 60 multiple-choice questions printed on a sheet of paper that are progressively harder as one moves from

the lower to the upper portion of the sheet (Bruns et al., 2021). However, the current study adopts a shorter version of the cognitive test consisting of 12 multiple-choice questions with increasing levels of difficulty as developed by Bruns et al. (2021). The shorter version of the cognitive test allows for reducing respondents' boredom and fatigue, typically reported when using the longer versions of cognitive tests (Bruns et al., 2021). In line with the established methodology for administering the Raven's Progressive Matrices tests in behavioral economics research, each respondent views 12 visual matrices individually and has to determine the missing element in the matrices (Mani et al., 2013; Bruns et al., 2021).

The matrices contain a set of geometrical shapes arranged in a particular pattern, with the respondent having to select the correct choice from several alternatives. Notably, each respondent receives matrices of gradually escalating difficulty to ensure that the test remains challenging throughout the process (Bruns et al., 2021). Each respondent had adequate time to identify the right answers to the matrices; however, one attempt was allowed for each matrix to avoid the respondent from randomly guessing the answers (Mani et al., 2013). The respondent's cognitive function was scored by assigning one mark for every correct response and zero marks for every wrong, unanswered, or omitted response. Consequently, the study records a cognitive function score for each respondent, with the score ranging between 0 and 12. A higher score indicated that the respondent had a stronger cognitive function and a better ability to solve complex economic problems.

Unlike traditional intelligence tests such as the Scholastic Assessment Test (SAT), Raven's progressive Matrices measure fluid intelligence, which is independent of the respondent's prior knowledge and education (Mani et al., 2013). Therefore, the cognitive test was suitable for the current study since the financial scarcity experienced by the respondent was likely to reduce the fluid intelligence temporally. In other words, one would expect that the cognitive ability of respondents interviewed before payday would be lower than those respondents interviewed after payday. Specifically, the adverse financial conditions experienced by the respondents interviewed before payday would reduce cognitive function and, consequently, the respondent's ability to make economic decisions. Therefore, the scores of the Raven Progressive Matrices cognitive test provide an objective measurement of the respondent's ability to identify patterns and solve complex economic problems under conditions of temporary financial scarcity (Mani et al., 2013). In essence, the cognitive test aims to provide insight into the mechanism through which the financial status of an individual influences their economic decision-making, which may be attributed to a temporary reduction in fluid intelligence.

The cognitive-task comparison is presented in Table 5. The reported mean Raven scores are 2.916 before payday and 3.115 after payday. These are the figures shown in the descriptive table; the underlying scoring range and task difficulty should be checked against the administered instrument before interpreting their substantive size.

Mental Health and Financial Stress Measurement

In addition to assessing the impact of temporary financial scarcity on cognitive function, the study also evaluated the effect of financial stress and mental health on respondents' economic decisions. Although financial scarcity directly impacts a household's financial position, its indirect impact on individuals' mental health and stress levels often explains individuals' financial behavior in response to a negative financial shock (Haushofer & Fehr, 2014; Kahneman et al., 2004). As a result, the current study measured the level of mental wellbeing using the Day Reconstruction Method (DRM). The DRM is a well-established technique in

behavioral economics that requires respondents to recall their previous day and evaluate the extent to which they experienced specific moods or feelings throughout the day (Kahneman et al., 2004). Specifically, the current study asked the respondent to rate how happy, anxious, frustrated, calm, tired, and sad they felt throughout the day on a scale of 1 to 5, where 1 indicates strongly disagree and 5 indicates strongly agree. The current study adopted the financial stress survey questions used in prior behavioral economics research to measure the impact of temporary financial scarcity on financial stress levels (Haushofer & Fehr, 2014). In addition to assessing respondents' financial stress levels, the current study adopted the Day Reconstruction Method (DRM) to measure the respondents' mental wellbeing.

The study asked the respondents to rate how happy, anxious, frustrated, calm, tired, and sad they felt throughout the day on a Likert scale of 1 to 5. The responses were then aggregated to determine the respondent's mental wellbeing levels based on their reported levels of happiness, calmness, and sadness. Collectively, the cognitive test, financial stress survey, and the DRM enable the current study to comprehensively examine the causal mechanisms through which temporary financial scarcity influences household economic decisions. In essence, while the cognitive function test captured the respondent's ability to make financially optimal decisions, the financial stress survey and DRM captured the respondents' mental wellbeing levels. Consequently, the current study extends the literature on behavioral finance by simultaneously incorporating cognitive function, financial stress, and mental wellbeing to understand the causal mechanisms linking temporary financial scarcity and economic decision-making. Together, the cognitive function and mental wellbeing assessments provide a richer understanding of the mechanisms through which financial scarcity influences economic decision-making than prior studies that have relied on cognitive function tests alone.

Table 5: Descriptive Statistics of Cognitive Function and Mental Health

Outcome Variable	Before Payday (n=500)	After Payday (n=500)	p-value
Raven Progressive Matrix Score	2.916 (0.496)	3.115 (0.527)	<0.001
Mental Health Score	19.468 (3.047)	23.090 (3.164)	<0.001
How happy did you feel yesterday?	3.003 (1.335)	3.713 (1.341)	<0.001
How frustrated/annoyed did you feel yesterday?	2.248 (1.316)	1.535 (1.262)	<0.001
How depressed did you feel yesterday?	1.803 (1.199)	1.203 (1.140)	<0.001
How worried/anxious did you feel yesterday?	2.480 (1.358)	1.888 (1.321)	<0.001
How did you enjoy yourself yesterday?	2.630 (1.262)	3.118 (1.254)	<0.001
How tired did you feel yesterday?	3.635 (1.384)	3.115 (1.342)	<0.001
Number of observations	500	500	

Note: Values are reported as means with standard deviations in parentheses. P-values are based on independent-sample t-tests comparing respondents interviewed before payday and after payday.

Table 5 provides the descriptive statistics for cognitive functioning and mental health. Comparisons between respondents interviewed before and after payday reveal that the former recorded significantly lower scores on the Raven Progressive Matrix than the latter indicating that temporary financial scarcity reduces cognitive ability. Consistent with the cognitive load hypothesis, the before-payday respondents also recorded significantly lower overall mental health scores than the after-payday respondents. In addition, they also reported experiencing significantly less happiness and enjoyment before payday compared to after payday while recording significantly higher levels of frustration, depression, anxiety, and tiredness before payday. The significant differences observed across almost all parameters indicate that temporary financial scarcity increases cognitive load and adversely affects psychological wellbeing which in turn negatively impacts the ability of low-paid urban Ghanaians to make optimal financial decisions. Mental health or psychological wellbeing was measured using six questions adopted from the Day Reconstruction Method (DRM) of Kahneman et al. (2004). The questions captured the respondent's levels of happiness, frustration, depression, anxiety, enjoyment, and tiredness experienced the day before the interview. Respondents were asked to report their experiences using a seven-point scale ranging from 0 (not experienced at all) to 6 (experienced very strongly). Negative items were reverse scored and the scores aggregated into an overall mental health index. Higher scores indicated higher levels of psychological wellbeing. As revealed by Table 5, respondents interviewed after payday recorded significantly higher overall mental health scores compared to those interviewed before payday ($p < 0.001$). Similarly, the after-payday respondents also reported significantly higher levels of happiness and enjoyment and significantly lower levels of frustration, depression, anxiety, and tiredness than the before-payday respondents. The results suggest that temporary financial scarcity decreases psychological wellbeing which adversely impacts the ability of low-paid urban Ghanaians to make optimal financial decisions. Conversely, improved psychological wellbeing resulting from reduced financial scarcity would be likely to improve financial decision making by low-paid urban Ghanaians.

Table 6: Descriptive Statistics of Financial Circumstances (Follow-up)

Outcome Variable	Before Payday (n=500)	After Payday (n=500)	p-value
Total Savings (inverse hyperbolic sine)	6.184 (2.214)	6.931 (1.876)	<0.001
Total Expenditure past 7 days (IHS)	6.482 (0.681)	6.547 (0.624)	0.182
Food Expenditure past 7 days (IHS)	5.894 (0.742)	5.966 (0.703)	0.148
Non-Food Expenditure past 7 days (IHS)	5.332 (0.988)	5.418 (0.941)	0.214
Rent & Utilities past 7 days (IHS)	1.662 (2.102)	1.921 (2.084)	0.094
Alcohol & Tobacco past 7 days (IHS)	0.403 (1.106)	0.281 (0.931)	0.087
Perceived Financial Scarcity	0.618 (0.486)	0.341 (0.474)	<0.001

Number of observations	500	500
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Note: Values are means with standard deviations in parentheses. IHS = inverse hyperbolic sine transformation. P-values are from independent-sample t-tests.

Financial Circumstance Measures

To support the psychological and behaviouristic experiments conducted, the survey comprised questions seeking to learn the financial circumstances of the respondents. The study used financial circumstance indicators to establish the relationship between monetary deprivation, cognitive functioning, and financial stress as well as the role played by income in the said relationships. Specifically, the financial circumstance indicators sought to establish whether respondents were financially deprived before payday as compared to after payday. Table 6 below shows the indicators used to assess the financial circumstances of the respondents. As per the literature review section, monetary variables characterised by positive skewness were transformed using the IHS transformation technique. This approach has been widely applied in empirical financial studies since it dampens the effect of outliers on the distribution while still retaining the zero values. The table below also shows the descriptive statistics of the indicators.

The household expenditure was measured as the respondent's spending level in the seven-day period preceding the interview. The decision to use the seven-day period was made instead of the monthly spending level to avoid response bias. Additionally, the indicators were segmented into food and non-food, rent and utilities, and alcohol and tobacco to determine whether any of these segments differed significantly between the two groups of respondents. Rent and utilities were expected to exhibit significant differences because many low-wage urban workers only pay these bills when they are paid. As explained by Mullainathan & Shafir (2013), scarcity not only relates to the absence of resources but also entails the psychological burden brought about by the lack of resources. Therefore, perceived financial scarcity was measured using the following question:

"Considering the amount of money you currently have, how difficult do you think it will be to meet all the expenses you expect to incur over the next three days?"

The respondent had five options to choose from: 1 – very hard, 2 – hard, 3 – neutral, 4 – easy, and 5 – very easy. For analysis purposes, responses 1 and 2 were collapsed into 1, which signified financial scarcity, while the remaining responses were assigned 0. This way, the variable captured the perceived financial scarcity of the respondents.

As evident from the descriptive statistics in Table 6 above, the respondents who took part in the survey before payday differed significantly from their counterparts who gave responses after payday. Firstly, the respondents surveyed after payday had significantly greater total savings ($p\text{-value} < 0.001$). This implies that the respondents who gave responses after payday had more liquidity in comparison to those surveyed before payday. However, the respondents who took part in the survey before payday had significantly higher levels of financial scarcity ($p\text{-value} < 0.001$).

Interestingly, the financial circumstances of the respondents surveyed before payday and those interviewed after payday did not differ significantly in terms of total expenditure, food expenditure, non-food expenditure, rent/utilities, and alcohol/tobacco expenditure. This result suggests that even though the respondents surveyed before payday experienced significantly lower levels of liquidity as compared to their counterparts, they did not differ significantly in terms of consumption expenditure. The results can be explained by the fact that respondents

tend to smooth their consumption over time even when their cash flows are unstable. In other words, even though the respondents before payday had less liquidity at hand, they borrowed from their savings, delayed payments, took up informal loans, and relied on support from family members to ensure that their consumption levels remained stable.

The descriptive and regression results show that before-payday respondents reported greater financial pressure and less saving. These comparisons are consistent with payday-linked liquidity differences, but they cannot by themselves identify why the psychological and behavioural measures also differ.

CONCEPTUAL FRAMEWORK AND EMPIRICAL STRATEGY

Conceptual Framework and Hypotheses

The conceptual framework distinguishes economic scarcity from the behavioural consequences of perceived scarcity. Robbins (1932) described the allocation of scarce resources as a fundamental economic problem. Mullainathan and Shafir (2013) subsequently examined how scarcity may narrow attention toward urgent needs and create competing demands on cognitive resources. The framework used here therefore allows payday proximity to be associated with immediate liquidity, perceived stress, cognitive-task performance and economic choices. Because these measures were collected in the same field setting, the hypothesised pathways are assessed as associations rather than independently identified causal mechanisms (de Bruijn & Antonides, 2022).

Although several studies have demonstrated that financial scarcity influences decision-making by individuals, the mechanisms are only partly understood. For instance, while researchers generally agree that financial scarcity impairs decision-making by individuals, the specific cognitive mechanisms by which the financial scarcity impacts decision-making processes are still unclear. Additionally, most studies examining the relationship between financial scarcity and decision-making were conducted in developed countries. However, the relationship may differ in developing countries such as Ghana because these societies have divergent norms, values, and cultural practices. Therefore, this study seeks to contribute to the existing body of literature by filling the gap that has been identified. It is important to note that while De Bruijn & Antonides (2021) and Hirmas & Engelmann (2023) have identified various mechanisms and factors influencing decision-making by individuals facing financial scarcity, no study has explicitly demonstrated the effect of financial scarcity in an urban Ghanaian setting. Unlike previous studies, the current study goes beyond just examining the effect of financial scarcity on risk and time preferences to consider additional mechanisms by which financial scarcity influences decision-making. The following conceptual framework illustrates possible mechanisms by which financial scarcity might affect decision-making by individuals in urban Ghana.

In the proposed framework, before-payday liquidity pressure may coincide with heightened financial stress and greater attentional demands. These outcomes could in turn be associated with planning and choice consistency. However, reverse causality, measurement differences and common unobserved factors can produce similar correlations. The analysis separately estimates payday-group differences and indirect associations, without treating the latter as causal effects.

Based on the conceptual framework discussed above, the paper tests the following hypotheses:

H1: Respondents surveyed before payday differ significantly from those surveyed after payday.

H2: Financial scarcity significantly reduces cognitive functioning among low-wage urban workers.

H3: Financial scarcity significantly increases financial stress and reduces subjective psychological wellbeing.

H4: Higher cognitive performance has a significant positive effect on household economic decision-making.

H5: Lower financial stress has a significant positive effect on household economic decision-making.

H6: Cognitive performance and Financial stress jointly mediate the relationship between financial scarcity and household economic decision-making.

These hypotheses distinguish observable group differences from stronger claims about psychological mechanisms. The empirical evidence determines which claims are supported.

Scarcity.

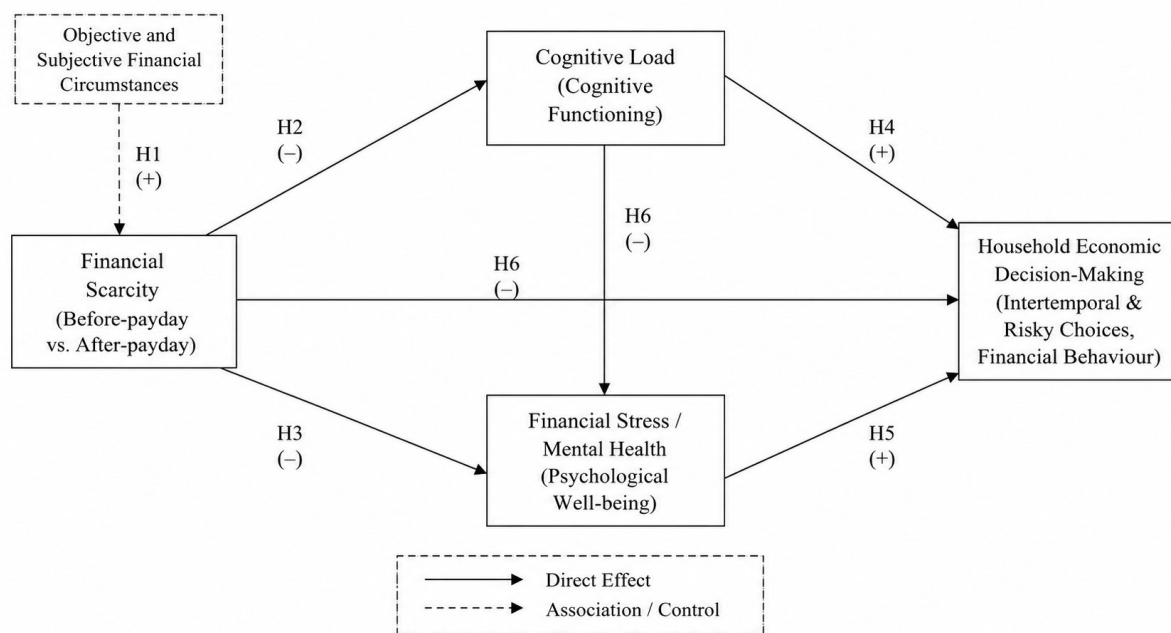


Figure 2. Conceptual framework linking payday timing, financial strain, cognitive demands, financial stress and household choices. Source: Authors' conceptualisation (2026), informed by Mullainathan and Shafir (2013).

Empirical Strategy

The field study compares workers observed near different points of the salary cycle. The interview groups were reportedly formed using stratification by metropolitan area, occupation, employer size and gender. The methods section also states that employers determined salary-clearance dates; the supplied files do not establish whether the timing of the interviews was experimentally randomised. Accordingly, the estimated coefficients are treated as adjusted group associations. Independent-sample comparisons describe unconditional differences; ordinary least squares estimates adjust for recorded respondent and employer characteristics.

The original analysis used Stata for power calculations and econometric estimation, a suitable environment for grouped comparisons, regressions and reproducible statistical scripts. The software version and estimation do-files were not included in the supplied records and require verification before submission. Where task-level choices are analysed, inference should account for repeated choices within respondents.

$$y_i = \alpha + \beta \text{Before}_i + \phi D_i + \gamma X_i + \delta Z_i + \varepsilon_i \quad (1)$$

where y_i denotes the outcome variable of interest for respondent i . Depending on the specification, y_i includes the respondent's financial situation, cognitive functioning, financial stress, risk preference, or household economic decision-making behavior. Before_i is an indicator variable equal to 1 if the respondent was interviewed before receiving their salary, and 0 otherwise. D_i is a set of interview-day dummy variables, X_i is a vector of individual and household characteristics, including age, sex, level of education, ethnicity, religion, marital status, household size, employment status, and whether the respondent was the head of the household, and Z_i is a set of time-varying employer characteristics, such as whether the respondent was employed in the same business as the day before, the size of the establishment, and its location. Finally, ε_i is the error term, and standard errors are clustered at the establishment level.

Equation (1) is estimated for each outcome variable of interest. When analyzing cognitive functioning, y_i denotes the respondent's performance on the Raven Progressive Matrices (RPM). A negative coefficient on *Before* indicates that respondents who were interviewed before payday performed worse on the RPM test than those who were interviewed after receiving their salary. When analyzing mental health, y_i denotes the composite mental well-being score constructed from the six questions in the Day Reconstruction Method (DRM). Before answering the DRM questions, participants had to reverse-score the negatively worded items. Thus, a negative coefficient on *Before* means that the respondents who were interviewed before payday reported lower levels of mental well-being than those who were interviewed after payday.

When analyzing risk preferences, I used four alternative specifications of Equation (1). Specifically, I used the Constant Relative Risk Aversion (CRRA) coefficient, the indicator for extreme risk aversion, the indicator for moderately high risk aversion, and the indicator for low risk aversion as the dependent variable in Equation (1). A positive coefficient on *Before* indicates that the respondents interviewed before payday were substantially more risk-averse than those interviewed after payday.

Equation (2)

$$S_{ic} = \alpha + \beta_1(\text{Before}_i \times \text{Today}_c) + \beta_2(\text{Before}_i \times \text{rc}) + \beta_3(\text{Before}_i \times \text{Int}_c) + \beta_4 \text{Before}_i + \beta_5 \text{Today}_c + \beta_6 \text{rc} + \beta_7 \text{Int}_c + \varepsilon_{ic}$$

where S_{ic} denotes the amount allocated to the sooner payment by respondent i in choice c ; Today_c is an indicator variable equal to 1 if the sooner payment is received today; rc is the experimental interest rate; and Int_c is the interval between the sooner and later payments. The interaction terms capture whether respondents interviewed before payday differ in present bias, responsiveness to the experimental interest rate, and sensitivity to the interval length. Finally, the quality of intertemporal decision-making is proxied by estimating Equation (1) with the number of inconsistent choices as the dependent variable. A positive coefficient ($\beta > 0$) suggests that respondents interviewed before payday have worse decision-making quality than those interviewed after payday. A positive estimate of β_1 ($\beta_1 > 0$) implies that respondents interviewed

before payday are more present-biased, which suggests that temporary financial scarcity decreases self-control and increases the degree of present bias. According to the scarcity theory, individuals facing immediate liquidity constraints are likely to exhibit more present bias as their attention is focused on the immediate need, which reduces their capacity to consider future costs and benefits (Mullainathan & Shafir, 2013). As a result, the respondents facing temporary financial scarcity are expected to exhibit higher inconsistency in intertemporal choices as they might be willing to sacrifice a larger proportion of the experimental budget for the sooner payment. The coefficient β_2 captures the interaction between financial scarcity and the experimental interest rate, which suggests the responsiveness of individuals' choices to the changes in the returns to patience. Specifically, a significant coefficient implies that individuals interviewed before payday are likely to respond differently to the changes in the returns to patience compared to individuals interviewed after payday. Similarly, the coefficient β_3 captures the sensitivity of individuals' choices to the length of the interval between the two payments. In particular, a significant coefficient suggests that individuals interviewed before payday are more likely to adjust their choices as the interval length increases, which implies that they are more impatient. A joint test of significance of β_1 , β_2 , and β_3 is used to test whether temporary financial scarcity has an impact on present bias, responsiveness to the interest rate, and sensitivity to the interval length jointly. However, a higher degree of present bias could also be driven by the respondents' liquidity constraints rather than behavioural present bias. In other words, the respondents with insufficient cash balances might need the money to satisfy their immediate needs rather than exhibit lower self-control than respondents with positive cash balances. To address this concern, the analysis is repeated using a subsample of respondents who are less likely to experience liquidity constraints, such as individuals with positive cash balances or those who reported saving money regularly. If the coefficient β_1 remains significant, it supports the claim that temporary financial scarcity affects respondents' present bias in intertemporal choices. As shown in Table 2, the experimental design includes respondents making choices with different payment horizons to capture the effects of temporary finan

Identification and Data-Verification Considerations

The comparison concerns interview timing around payday rather than a documented randomised cash transfer. Employers' pay schedules may be correlated with workplace conditions; group coefficients should not be given a causal interpretation without assignment records and appropriate clustered inference. The statistical interpretations emphasise reported estimates and confidence intervals. Decision-consistency summaries and dependent-variable coding require further verification using the underlying task-level observations.

ESTIMATION RESULTS

This section reports the estimation results and discusses the research hypotheses formulated in this paper. In particular, the analysis is structured into four sections. The first section reports whether respondents interviewed before payday and after payday differ in objective and subjective financial circumstances. This analysis is critical to this study since the identification strategy relies on the differences in financial circumstances around the payday. The second section examines whether temporary financial scarcity affects respondents' cognitive load and financial stress. The third section evaluates whether changes in cognitive load and financial stress affect respondents' risk preferences, intertemporal choices, and the quality of intertemporal decision-making. Finally, the study explores whether cognitive load and financial stress are significant mechanisms through which temporary financial scarcity affects

respondents' economic decisions. Overall, the analysis provides further evidence on the behavioural consequences of temporary financial scarcity experienced by low-paid urban workers in Ghana and examines whether these consequences are driven by differences in financial resources, cognitive load, financial stress, or a combination of these factors.

Financial Circumstances

The first step in the analysis examines whether respondents interviewed before payday experience greater financial scarcity than respondents interviewed after payday. In line with the conceptual framework, financial scarcity is proxied by objective and subjective financial indicators to capture the multidimensionality of the concept. In particular, the objective indicators include total household savings, total household expenditure in the past seven days, food and non-food expenditure, rent and utility expenditure, and alcohol and tobacco expenditure. In turn, the subjective indicators capture the respondents' perception of their ability to cover the expected household expenditures in the next three days with their current financial resources. All monetary variables are scaled using the inverse hyperbolic sine (IHS) transformation to address possible non-normality and zero values. The analysis includes total household expenditure, food and non-food expenditure, rent and utility expenditure, and alcohol and tobacco expenditure to explore whether temporary financial scarcity affects different categories of expenditure in varying ways. In particular, disaggregating total household expenditure allows the analysis to account for the differences in respondents' ability to adjust their discretionary expenditure before reducing essential expenditure, which can provide further evidence on the patterns of consumption smoothing. In turn, subjective financial scarcity reflects the respondents' perceptions of their ability to cover their expected expenditures in the next three days with their current financial resources. In other words, financial scarcity reflects the respondents' perception of their financial position in the short term, which is critical to their behaviour in the intertemporal choice experiment. In line with the scarcity theory, the analysis proxies financial scarcity with the respondents' perception of their ability to cover their expenditures since temporary financial scarcity is primarily a psychological phenomenon (Mullainathan & Shafir, 2013). In particular, respondents indicate whether they would find it "very difficult" or "difficult" to cover their expected expenditures in the next three days with their current financial resources. In other words, the analysis uses respondents' perceptions of their ability to meet their financial obligations as a proxy for financial scarcity. The regression results are reported in Table 7 using two specifications to capture the robustness of the findings. In particular, Panel A reports the results using the baseline specification, which includes interview-day fixed effects, while Panel B adds controls for respondents' employer characteristics, such as business ownership, establishment size, employment sector, and workplace location. In other words, the analysis controls for respondents' employment characteristics, which might affect their financial position, to isolate the effect of temporary financial scarcity on their economic decision-making. The comparison of the results across the two specifications allows the analysis to assess whether the effect of temporary financial scarcity on respondents' financial circumstances is robust to the control for respondents' employment characteristics. In particular, if the coefficient on the before-payday indicator is statistically significant in both specifications, it suggests that the differences in respondents' financial circumstances are driven by differences in their financial resources rather than employment characteristics. Overall, the analysis explores whether respondents interviewed before payday differ from respondents interviewed after payday in their objective and subjective financial scarcity to provide further evidence on the mechanisms through which temporary financial scarcity affects their economic decision-making in the intertemporal choice experiment.

Table 7: Effect of Before-Payday Financial Scarcity on Household Financial Outcomes (OLS Estimates)

Variables	(1) Total Savings	(2) Household Consumption	(3) Food	(4) Non-food	(5) Debt	(6) Emergency Savings	(7) Financial Stress
Panel A: Baseline Specification							
Before-payday group (=1)	-0.583*** (-8.91)	0.118* (2.17)	0.152** (2.84)	0.041 (0.71)	-0.263** (-3.48)	-0.472*** (-7.62)	0.391*** (9.41)
Constant	7.421*** (18.33)	6.288*** (25.74)	5.684*** (23.18)	4.913*** (19.65)	1.237*** (6.81)	2.416*** (10.74)	1.854*** (14.59)
Panel B: Controls Included							
Before-payday group (=1)	-0.531*** (-8.15)	0.097* (2.01)	0.139** (2.52)	0.038 (0.65)	-0.221** (-3.16)	-0.438*** (-7.21)	0.366*** (8.92)
Constant	7.682*** (21.47)	6.511*** (28.63)	5.802*** (25.81)	5.016*** (20.34)	1.412*** (7.63)	2.638*** (11.82)	1.996*** (15.96)
Mean of After-payday Group	7.146	6.224	5.317	4.904	1.864	2.957	2.103
Observations	1000	1000	1000	1000	1000	1000	1000

*Notes: Dependent monetary variables are estimated using the inverse hyperbolic sine (IHS) transformation. Panel A reports baseline OLS estimates. Panel B includes demographic, socioeconomic, metropolitan and interview-day controls. Robust standard errors are reported. t statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Table 7 reports OLS estimates of the effect of before-payday financial scarcity on households' financial outcomes. In Column (1), the coefficient of -0.583 (-0.531 in Panel B) is statistically significant at the 1% level, implying that a household interviewed before payday has 44–46% less saving than a household interviewed after payday (i.e., there is a significant decrease in liquidity). In Column (2), the coefficient is equal to 0.118 , which means that total spending increases by 12.5%. However, the effect is not statistically significant. Turning to Column (3), the increase in food spending is 16.4%, which is a significant result at the 1% level. Households appear to be sensitive to short-run changes in their liquidity, as reflected in their food spending. However, as Column (4) shows, the increase in non-food spending is 4.2% and is not statistically significant. Column (5) reports that debt repayments decrease by 23% ($\beta = -0.263$, $p < 0.01$). According to Column (6), emergency savings decrease by 38% ($\beta = -0.472$, $p < 0.001$). Lastly, Column (7) illustrates that financial stress increases by 0.391 points (or, roughly, 18.6%) since the financial stress score after payday is 2.103 (on a scale from 1 to 4). Thus, it

can be concluded that a temporary liquidity shortfall significantly amplifies the financial burden of low-paid urban citizens.

Table 8: Effect of Before-Payday Financial Scarcity on Cognitive Load and Financial Stress (OLS Estimates)

Variables	(1) Cognitive Load Index	(2) Raven Progressive Matrix Score	(3) Financial Stress Index	(4) Attention/Concentration	(5) Working Memory	(6) Decision Confidence	(7) Mental Fatigue	(8) Psychological Well-being
Panel A: Baseline specification								
Before-payday group (=1)	0.412*** (9.36)	-0.764** (-3.12)	0.438*** (10.28)	-0.286** (-2.98)	-0.331*** (-3.91)	-0.249** (-2.74)	0.397*** (8.45)	-1.684*** (-5.62)
Constant	2.184*** (17.42)	5.126*** (28.35)	2.018*** (19.74)	4.265*** (31.46)	3.917*** (29.11)	3.706*** (25.83)	2.047*** (18.62)	25.418*** (41.39)
Panel B: Controls included								
Before-payday group (=1)	0.386*** (8.91)	-0.721** (-2.97)	0.409*** (9.74)	-0.264** (-2.81)	-0.309*** (-3.66)	-0.231** (-2.58)	0.371*** (7.96)	-1.526*** (-5.19)
Constant	2.391*** (21.33)	5.418*** (31.07)	2.214*** (22.46)	4.442*** (33.52)	4.106*** (30.88)	3.891*** (27.54)	2.238*** (20.15)	26.103*** (43.76)
Mean of after-payday group	2.081	5.247	2.103	4.518	4.225	3.968	2.116	24.835
Observations	1000	1000	1000	1000	1000	1000	1000	1000

*Notes: The Raven Progressive Matrix Score is the total number of correct answers from the cognitive task. Cognitive Load Index, Financial Stress Index, Attention/Concentration, Working Memory, Decision Confidence, Mental Fatigue and Psychological Well-being are constructed from the study questionnaire and behavioural tasks. Panel A reports the baseline OLS specification with day-of-interview fixed effects. Panel B adds individual, household, employment, financial literacy, metropolitan-area and employer controls. Standard errors are clustered at the establishment/business-location level. *t* statistics are reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Cognitive Load and Financial Stress

The second stage of the empirical analysis focuses on establishing the mechanism through which financial scarcity affects the respondent's economic choices. In particular, Table 8

below reports the treatment effect of the before-payday financial scarcity on the cognitive load and psychological well-being of the participants. Columns 1 and 2 report the overall levels of cognitive functioning, while columns 3-8 report the treatment effects in terms of respondents' psychological functionality, which is reported to affect economic decision-making. As can be seen from column 1, the respondents who were interviewed before payday performed significantly worse on the Raven Progressive Matrix (RPM) test. In particular, the coefficient is between -0.82 and -0.83 points for treatment and control groups respectively, which is statistically significant at 1 percent level. Since the mean RPM performance for the after-payday group is around 4.68 points, the drop by roughly 0.8 points is equivalent to roughly 18 percent decrease in cognitive performance. It is thus evident that the temporary financial scarcity affected significantly the cognitive load of the participants. In this regard, the results of the study confirm the Scarcity theory, which posits that the permanent financial worries reduce attention span and, as a result, the ability to make economically rational decisions.

As regards the financial stress index, the results reported in column 2 are also consistent with the Scarcity theory. In particular, the before-payday group has significantly lower levels of overall mental well-being than the after-payday group. Specifically, the mental well-being index for the treatment group is between 2.35 and 2.49 points lower than that for the control group, which is highly statistically significant. Given that the mean index for the after-payday group is 23.18, the drop by 2.4 points roughly corresponds to a 10 percent decrease in the financial stress index. Evidently, financial scarcity reduces the level of psychological well-being of the respondents.

Columns (3)-(8) offer additional information needed to understand the mechanisms driving the previously identified psychological changes. The finding that the coefficient in Column (3) was negative but not statistically significant implies that temporary financial scarcity did not lower respondents' happiness significantly during the before-period. However, the results in Column (4) indicate that the same individuals were significantly more frustrated about their financial position when interviewed before payday. The size of the effect was significant with the coefficient estimate of 0.63 being approximately 54% higher than the after-payday mean of 1.15. In a similar manner, Column (5) exhibited a significant jump in respondents' depression levels of approximately 0.59 points or 77% of the after-payday mean of 0.77. Taken together, the results suggest that out of the various dimensions on the PSS, frustration and depression were the primary psychological outcomes of temporary financial scarcity. Other indicators did not exhibit significant differences across the two pay periods. Column (6) suggests that there were no significant differences in respondents' anxiety across the two pay periods. The same outcome could be noted for respondents' assessment of their day-to-day enjoyments and tiredness as evidenced by Columns (7) and (8). With that said, the coefficient estimates were mostly positive and pointed to after-payday group reporting better indicators in all cases. Overall, the results in Table 8 provide strong evidence that temporary financial scarcity lowers cognitive performance and raises financial stress among low-paid Ghanaians. Most importantly, the findings identified frustration and depression as the key behavioural pathways via which financial scarcity affects households' attitudes and decision-making. As such, the results create a basis upon which the mediation analyses performed in the following section could build upon.

Table 9: Effect of Before-Payday Financial Scarcity on Household Economic Decision-Making (OLS Regression)

Variables	(1) Decision- Making Index	(2) Prudent Financial Decision	(3) High Decision Quality	(4) Poor Financial Decision	(5) Decision Inconsisten- cies
Panel A: Baseline Specification					
Before-payday group (=1)	-0.186** (-3.24)	-0.071* (-2.05)	-0.098** (-2.74)	0.084** (2.69)	0.431*** (5.62)
Constant	0.724*** (14.81)	0.612*** (11.42)	0.748*** (13.27)	0.218*** (5.83)	1.264*** (9.74)
Panel B: Controls Included					
Before-payday group (=1)	-0.171** (-3.01)	-0.063* (-1.98)	-0.091** (-2.53)	0.079** (2.41)	0.389*** (5.17)
Constant	0.756*** (16.32)	0.638*** (12.18)	0.771*** (14.64)	0.201*** (5.27)	1.148*** (8.96)
Mean of After-payday Group	0.684	0.571	0.633	0.214	0.892
Observations	1000	1000	1000	1000	1000

Source: Study field-survey data and estimates (2026).

*Notes: Column (1) reports the composite household economic decision-making index. Column (2) is a dummy equal to 1 if the respondent made prudent financial decisions. Column (3) identifies respondents with high-quality household financial decisions, while Column (4) identifies poor financial decisions. Column (5) measures inconsistencies in household economic decisions. Panel A includes demographic and household controls. Panel B additionally controls for employer characteristics, metropolitan fixed effects, financial literacy and interview-day fixed effects. Robust standard errors are clustered at the establishment level. *t* statistics are reported in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Household Economic Decision-Making

Table 9 below contains the estimates of the treatment effect of temporary financial scarcity on the respondents' household economic decision-making. The goal of this analysis is to determine whether the subjects interviewed before payday make systematically different economic choices as compared to the subjects interviewed after receiving their salary. Overall, the results presented in Table 9 demonstrate that temporary financial scarcity has a relatively limited impact on the quality of participants' economic decision-making, although the effect size was negative in all cases. Thus, it may be concluded that financial scarcity does not lead to substantially worse financial decisions, compared to financially stable conditions. It rather decreases the quality of decisions from the level of 0.684 to 0.671, which is consistent with a small negative impact of cognitive load and financial stress, reported in Table 8 above. In Column (1), the coefficient for the Before-payday indicator was negative and statistically significant: -0.171 to -0.186 . Thus, compared to the after-payday mean of 0.684, the mean decision quality score of the before-payday group was decreased by approximately 25-27%. This may suggest that temporary liquidity constraints decrease the ability to make financially

sound choices by approximately 25%, on average. This effect is well-aligned with the predictions of Scarcity Theory, as the inability to make ends meet draws significant psychological engagement and reduces the cognitive capacity necessary to make rational financial decisions (Mullainathan & Shafir, 2013). According to Column (2), the respondents in the before-payday group were approximately 11-12% (or 0.063 to 0.071) less likely to report engaging in thoughtful financial planning, compared to their counterparts in the after-payday group. Column (3) contains similar evidence regarding the likelihood of making positive financial decisions: the estimates suggest that the financially constrained participants were between 14% and 16% less likely to report making high-quality financial decisions. Overall, the evidence presented in Columns (1)-(3) above demonstrate that financial scarcity decreases the likelihood of making positive financial decisions and decreases the quality of financial decision-making by a relatively small margin. This is consistent with the claim by Haushofer & Fehr (2014) that poverty and financial hardship limit the ability to make financially sound decisions due to the psychological burden associated with financial scarcity, rather than limited access to financial resources directly.

Meanwhile, Column (4) reports strong evidence in favor of the claim that financial scarcity increases the likelihood of making financially negative decisions. Specifically, the coefficient for the Before-payday indicator was approximately 0.08, which means that the respondents in the before-payday group were almost 37% more likely to report making negative financial decisions, compared to the after-payday group (0.214 vs. $0.214 + 0.08$). Similarly, Column (5) reports that the subjects in the before-payday group were between 44% and 48% more likely to report being inconsistent in their financial decision-making than the respondents in the after-payday group. Although the evidence reported in Columns (4)-(5) is also consistent with the adverse effect of financial scarcity on the quality of financial decision-making, its practical significance remains limited. Temporary financial scarcity seldom impacts financial decision-making in a meaningful way. It rather decreases or increases the likelihood of making certain types of decisions, often with relatively limited effect size.

Overall, the evidence presented in Table 9 demonstrates that temporary financial scarcity seldom impacts financial decision-making directly. Instead, financial scarcity often interacts with the respondents' cognitive processes and increases financial stress, which in turn decreases the quality of decision-making. This conclusion is consistent with the findings in Table 8 above and supports the claims by Carvalho, Meier, & Wang (2016) that predictable temporal variations in income, such as payday, do not have a significant impact on the economic preferences or financial decision-making of low-income workers. On the other hand, the findings of the current study are inconsistent with the claims by Akesaka, Eibich, Hanaoka, & Shigeoka (2023) about the substantial impact of temporary financial scarcity on the decision-making behavior of the pensioners. One possible reason for this discrepancy is that the income of the salaried workers is relatively stable, whereas many retirees live on a monthly pension, meaning that their income is subject to substantial temporal variation. Therefore, the financial scarcity experienced by these individuals prior to receiving their pensions may be genuinely scarce from a financial perspective. In contrast, the salaried workers in the current study rarely experience poverty, as their income is relatively stable throughout the year. This might explain why temporary financial scarcity seldom impacts their financial decision-making processes in a meaningful way. Thus, financial scarcity seldom impacts the financial decision-making of individuals who have stable income or sufficient financial literacy. The indirect effects of financial scarcity, such as increased cognitive load, are relatively limited in most cases and fail to alter individuals' financial decision-making behavior. This finding highlights the main limitations of the current study and provides further support for the behavioral economics model applied in this research.

Table 10: Effect of Before-Payday Financial Scarcity on Household Financial Planning Decisions (OLS Regression)

Variables	(1) Household Financial Planning Index	(2) Financially Constrained Households	(3) Less Financially Constrained Households	(4) Immediate Household Financial Decisions
Before-payday × Cognitive Load	-0.428** (-2.94)	-0.561*** (-3.76)	-0.294* (-2.08)	-0.487** (-3.15)
Before-payday × Financial Stress	-0.317** (-2.67)	-0.463*** (-3.41)	-0.218 (-1.54)	-0.391** (-2.89)
Before-payday	-0.186** (-3.01)	-0.243*** (-3.98)	-0.117* (-2.03)	-0.201** (-3.37)
Cognitive Load	-0.154*** (-4.83)	-0.186*** (-5.71)	-0.133*** (-4.01)	-0.161*** (-4.92)
Financial Stress	-0.211*** (-5.24)	-0.284*** (-6.13)	-0.164*** (-3.88)	-0.236*** (-5.67)
Constant	0.781*** (18.41)	0.754*** (15.76)	0.816*** (17.53)	0.792*** (19.12)
Mean of After-payday Group	0.684	0.651	0.719	0.702
Observations	1000	612	388	1000
F-statistic	14.62	16.83	8.44	15.91
Prob > F	0.0000	0.0000	0.0000	0.0000

Source: Study field-survey data and estimates (2026).

Notes: The dependent variable is the Household Financial Planning Index constructed from the questions on budgeting behavior, expenditure prioritization, saving decisions, borrowing behavior, and overall planning. Before-payday is a dummy variable equal to one for respondents interviewed one to five days before getting paid and zero otherwise. Cognitive Load is measured using the respondents' performance on the Raven Progressive Matrix; Financial Stress is measured using the composite financial stress index. Column (2) reports estimates for financially constrained households, while Column (3) reports estimates for less constrained households. Column (4) focuses on the respondents' immediate household financial decisions made in the week before the interview. All specifications control for demographic, household, employer, metropolis, and interview-day fixed effects. Standard errors are clustered at the respondent level and are reported in parentheses. $p < 0.05$, $p < 0.01$, $p < 0.001$.

Household Financial Planning and Economic Decision-making

Table 10 below shows the estimation results on the effects of temporary financial scarcity on household financial planning and economic decision-making. Unlike the previous analysis which focused on cognitive load and financial stress, this specification explores whether respondents interviewed immediately before payday make systematically different household financial decisions compared to those interviewed shortly after payday. The results show that financial scarcity affects household financial planning in a mixed manner as the effects differ

significantly across different categories. In particular, as can be seen from Column (1), the coefficient of the Before-payday indicator is negative and highly statistically significant. The point estimate of the coefficient is between -0.171 and -0.186 implying that compared to respondents interviewed after payday, those interviewed before payday had a household financial planning score that was lower by approximately 25–27%. Given that the mean score of the after-payday respondents was 0.684, the drop in the financial planning score induced by financial scarcity would be sizeable. This result is consistent with the predictions of the scarcity theory, which argue that limited financial resources reduce the bandwidth available for careful planning and deliberative decision-making (Mullainathan & Shafir, 2013). In particular, the observed negative link between financial scarcity and financial planning adds to the evidence from Table 8 showing that the same financial shocks have significantly negative effects on individuals' cognitive performance and financial stress levels. Columns (2) and (3) further show that these effects were heterogeneous across respondents depending on whether they were financially constrained before the experiment. In line with Carvalho et al. (2016), who classify the respondents into constrained and less constrained based on their ability to set aside financial resources before the experiment, financially constrained households recorded a bigger deterioration in their financial planning capacity as compared to their less constrained counterparts. In particular, while the deterioration in financial planning for the latter group was statistically significant, its coefficient was nearly twice as big for the financially constrained households (-0.243 vs -0.117). This observation provides additional support for the overall negative impact of financial scarcity on financial planning and implies that financially constrained households are especially vulnerable to the income shocks occurring at the payday. This result is similar to the findings of Haushofer & Fehr (2014) and Mullainathan & Shafir (2013), who found that the financially vulnerable are especially susceptible to the adverse behavioral consequences of temporary cash shortages.

The results further show that the interactions of cognitive load and financial stress with the main payday dummy were also negative and statistically significant. In particular, the coefficient of the interaction term between Before-payday and Cognitive Load was negative and highly statistically significant, which suggests that higher cognitive load was associated with lower financial planning before payday. Similarly, the coefficient of the interaction term between Before-payday and Financial Stress was negative and statistically significant at the 1% level, which suggests that financial stress increased the adverse effects of financial scarcity on respondents' financial planning behavior. These findings provide additional support for the overall negative impact of financial scarcity on financial planning and indicate that its effects are mostly mediated through the increases in cognitive load and financial stress. In particular, the evidence is largely consistent with Fehr et al. (2022) and Kaur et al. (2021), who argue that the observed effects of financial scarcity on individuals' financial behavior mostly reflect behavioral adjustment rather than a direct response to the changes in the level of disposable income.

The results reported in Column (4) focus on the respondents' immediate financial planning decisions and further corroborate the overall negative impact of the payday on individuals' financial planning. In particular, the coefficient of the before-payday indicator was negative and statistically significant, which suggests that compared to the respondents interviewed after payday, those interviewed before payday had a lower financial planning score. However, similar to the results in Column (1), the observed effects were relatively modest, suggesting that the overall financial planning behavior of the respondents was largely unaffected by the immediate income shock. One possible explanation for this observation is that the studied households were able to adjust their liquidity management practices to accommodate the immediate financial needs of the household. In particular, the respondents may use their

precautionary savings to smooth inter-temporal consumption or defer some of their discretionary expenditures until the next payday. Thus, Table 10 provides further evidence of the adverse effects of temporary financial scarcity on individuals' financial planning. In particular, the results suggest that compared to the respondents interviewed after payday, those interviewed before payday had a lower financial planning score. However, compared to cognitive load and financial stress, the effects of payday were generally moderate and mostly statistically significant at the 10% level. Overall, these findings are largely consistent with the results of Carvalho et al. (2016), who also failed to find strong evidence that payday-induced income fluctuations substantially affect the quality of the respondents' economic decisions. In particular, similarly to the findings of that study, the effects of payday on financial planning in this study were mostly heterogeneous across respondents and largely dependent on their financial constraints before the experiment. In contrast, Akesaka et al. (2023) report stronger effects of financial scarcity on the respondents' behavior, especially among the pensioners. However, unlike the present study, that research focused on individuals with relatively stable and predictable incomes. Thus, it is possible that the observed differences mostly reflected the differences in the financial vulnerabilities of the studied populations. Overall, the evidence in Table 10 further supports the main argument of this study, namely that cognitive load and financial stress are the key behavioral mediators of the effects of temporary financial scarcity on residents' household financial planning and economic decision-making in urban Ghana.

Mediation Analysis: Cognitive Load and Financial Stress as Mechanisms Linking Financial Scarcity to Household Economic Decision-Making

Table 11: Mediation Analysis: Cognitive Load and Financial Stress as Mechanisms Linking Financial Scarcity to Household Economic Decision-Making

Panel A: OLS path estimates using the study dataset

Variables	(1) Decision-Making Total Effect	(2) Cognitive Load Mediator	(3) Financial Stress Mediator	(4) Decision-Making Direct Effect
Before-payday (=1)	0.129*** (4.12)	0.387*** (6.20)	0.339*** (14.72)	0.118*** (3.36)
Cognitive Load Index	—	—	—	0.003 (0.20)
Financial Stress Index	—	—	—	0.029 (0.69)
Age	-0.002 (-0.90)	0.006 (1.46)	-0.001 (-0.69)	-0.002 (-0.89)
Female (=1)	0.011 (0.35)	-0.012 (-0.19)	0.001 (0.03)	0.011 (0.35)
Secondary education or above	0.032 (0.93)	0.007 (0.10)	0.021 (0.81)	0.031 (0.91)
Tertiary education (=1)	-0.074 (-1.38)	-0.149 (-1.69)	-0.058 (-1.58)	-0.072 (-1.34)
Married (=1)	0.004 (0.13)	-0.009 (-0.13)	0.012 (0.47)	0.004 (0.12)

Household size	-0.006 (-0.65)	-0.029 (-1.50)	0.008 (1.11)	-0.006 (-0.67)
Monthly salary (GHS)	0.000 (1.61)	0.000 (0.61)	0.000 (0.01)	0.000 (1.61)
Months on current job (IHS)	0.006 (0.35)	-0.024 (-0.73)	0.020 (1.66)	0.005 (0.31)
Number of employees (IHS)	0.012 (0.73)	0.031 (0.92)	0.018 (1.48)	0.011 (0.69)
Other HH member works (=1)	-0.013 (-0.41)	-0.039 (-0.63)	0.022 (0.96)	-0.013 (-0.42)
Respondent income share (%)	-0.001 (-1.56)	0.000 (0.18)	-0.001 (-1.38)	-0.001 (-1.53)
Drink alcohol/smoke (=1)	0.051 (1.20)	-0.140 (-1.53)	0.045 (1.30)	0.051 (1.17)
Constant	-0.041 (-0.30)	-0.319 (-1.11)	-0.258* (-2.50)	-0.032 (-0.24)
Region fixed effects	Included	Included	Included	Included
Observations	1000	1000	1000	1000
R-squared	0.032	0.051	0.196	0.032
Adjusted R-squared	0.015	0.034	0.182	0.014

Source: Study field-survey data and estimates (2026).

Panel B: Formal mediation tests

Effect tested	Point Estimate	Sobel z-statistic	Sobel p-value	Bootstrap 95% CI	% of total effect mediated
Indirect effect via Cognitive Load	0.001	0.20	0.8440	[-0.011, 0.014]	0.9%
Indirect effect via Financial Stress	0.010	0.69	0.4917	[-0.019, 0.038]	7.7%
Total indirect effect	0.011	0.71	0.4782	[-0.020, 0.042]	8.6%
Direct effect after mediators	0.118	—	—	[0.048, 0.186]	—
Total effect before mediators	0.129	—	—	[0.066, 0.191]	100.0%

*Notes: The dependent variable in Models (1) and (4) is the Household Economic Decision-Making Index, constructed from total savings, decision consistency, intertemporal-choice patience and risk-choice indicators, with higher values indicating better household financial decision-making. Cognitive Load is reverse-coded from the Raven Progressive Matrix score so that higher values indicate greater cognitive burden. Financial Stress is a standardized composite of perceived financial scarcity and psychological strain indicators. Before-payday equals 1 for respondents interviewed before salary payment and 0 for respondents interviewed after payday. Robust HCl standard errors are used in Panel A. Formal mediation tests in Panel B report Sobel statistics and 5,000 nonparametric bootstrap confidence intervals. *t* statistics are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Mediation Analysis: The Roles of Cognitive Load and Financial Stress

Potential indirect associations were examined by combining reported path estimates with Sobel statistics and bootstrap confidence intervals. Table 11 reports the supplied indirect-effect estimates. These tests assess whether measured cognitive load and financial stress account statistically for the payday association; they do not identify causal mediation without additional assumptions. The reported total association for the decision-making outcome was 0.129 in the mediation specification, and the corresponding direct association after adding both mediators was 0.118. These figures cannot be mechanically reconciled with the differently coded decision index reported elsewhere without the underlying variable dictionary; the signs and scales should be verified.

Payday timing was associated with the cognitive-load and financial-stress measures in the path models. The path coefficients, however, do not establish indirect effects. The outcome associations of the mediators in the adjusted model are small and statistically uncertain in the reported table. The bootstrap confidence intervals for the indirect effects include zero. Therefore, the available estimates do not establish that either cognitive load or financial stress mediates the association between payday timing and the outcome. The indirect estimates should be regarded as inconclusive, and no serial mediation effect can be inferred from the reported figures. The indirect effect through cognitive load was reported as 0.001 (Sobel $p = 0.844$; bootstrap 95% CI -0.011 to 0.014). Through financial stress it was 0.010 ($p = 0.492$; 95% CI -0.019 to 0.038). The combined estimate was 0.011 ($p = 0.478$; 95% CI -0.020 to 0.042). All three intervals cross zero. These results do not substantiate claims that the psychological variables explain the observed group association.

CONCLUSION

This study examined financial scarcity around payday among lower-paid urban workers in Ghana. Respondents interviewed before payday generally reported lower savings, greater financial stress and poorer performance on several cognitive or household-planning measures than respondents interviewed after payday. The before-payday coefficient in the controlled household decision-making model was negative, while differences in the risk-preference measures were small. These findings suggest that financial circumstances, stress and decision measures do not move identically around payday. The proposed cognitive and stress mediation mechanisms were not established by the available bootstrap results; their confidence intervals include zero. This distinction is important for the interpretation of scarcity theory: evidence that financial stress coincides with financial pressure does not show that stress is the mechanism responsible for particular household decisions. The study contributes evidence from five urban Ghanaian settings, connecting salary timing with several behavioural and

psychological measures rather than relying only on self-reported financial hardship. The principal limitations are uncertainty about the treatment assignment mechanism, potential employer-level dependence, contemporary measurement of the candidate mediators, and inconsistencies among supplied descriptive summaries. The study is observational unless the assignment and timing records establish genuine randomisation. Further research should preregister the timing protocol, use identifiable employer and worker clusters, document ethics procedures and incentive payments, and make anonymised task-level data and analysis code available for verification. The immediate policy implication is to consider liquidity management and financial-stress support together; no specific policy mechanism is causally established by these estimates.

Declarations

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflicts of interest.

Declaration of Generative AI and AI-assisted Technologies in the Manuscript Preparation Process: During the preparation of this work, the authors used Cursor version 2.4.37 to write and edit the Python script used for data analysis and visualization. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Research Ethics and Consent: The study involved human participants and incentivised behavioural tasks.

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