Financial Literacy and Aspirations: Experimental Evidence from Eastern Uganda

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Masters Thesis

Financial Literacy and Aspirations: Experimental Evidence from Uganda

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Advisor: Bruce Wydick

May 9th, 2024
Abstract

Financial literacy and the cultivation of aspirations are pivotal in empowering individuals and fostering economic growth, particularly within disadvantaged communities. Although prior research has extensively analyzed the individual effects of financial education and motivational interventions on economic behaviors, there is less clarity on how the synergy between them can collectively impact the socioeconomic status of individuals in developing economies, especially women. Through randomized control experiment (RCT), this study explored the effectiveness of two interventions; 1) a financial literacy digital gaming application and, 2) an aspirations intervention (a short video documentary and a follow-up curriculum) in not only enhancing financial knowledge but also in elevating personal and economic aspirations. The findings reveal significant improvements, with financial literacy scores increasing by 0.50σ and aspirations indices by 0.38σ among participants. These results underscore the potential of such integrative approaches in fostering profound changes in financial behavior and aspirational attitudes, thereby contributing to economic empowerment and sustainable development. This research provides valuable insights into effective methodologies for advancing financial literacy and empowerment initiatives by demonstrating the synergistic benefits of combining educational and motivational strategies. This study fills a critical gap in academic literature and offers actionable guidance for policymakers and educators aiming to implement similar programs in other contexts, aiming to achieve widespread socio-economic improvements.
Acknowledgements

I extend my deepest gratitude to an array of individuals whose unparalleled support has been instrumental in the fruition of this thesis. Foremost, I owe a profound debt of gratitude to my academic advisor, Professor. Bruce Wydick, whose scholarly guidance and recent dedication have immensely enriched my research experience. I am grateful to Professor Andrew Hobbs, whose expert guidance was invaluable throughout the research process. I am incredibly grateful for the dedication and hard work of my classmates; Veronika Davis, Prakriti Shakya, Jackson Kadyampeni, Devin Johnson, and Lucie Schulz who collaborated on the project for their significant contribution. Each of them brought unique insights and skills that enriched our research, and their commitment to a high standard of data collection was crucial in achieving robust results. I am also thankful to the faculty members and administrative staff of the University of San Francisco, Department of Economics, whose endless support and academic resources have been indispensable. Their commitment to fostering an environment conducive to rigorous research and learning deserves special mention. My sincere appreciation goes to the research participants in Uganda, whose enthusiastic involvement and candid feedback have been the bedrock of this study’s empirical analysis. The cooperation of FINCA Uganda and various local community leaders facilitated a smooth and effective fieldwork process, for which I am incredibly grateful. I thank my classmates. Finally, my heartfelt gratitude goes to my family and friends for their patience, encouragement, and unwavering support throughout my academic journey. This work is dedicated to all individuals striving to improve their financial literacy and to those who support them in these endeavors. I hope that our findings contribute to the broader efforts to enhance financial empowerment and economic well-being worldwide.
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1 Introduction

1.1 Background

This study makes a case for the causal impact of financial literacy on the financial well-being of women in developing economies, namely, Uganda. Women are a particular interest group in this study because of several reasons. Compared to men, women make up the largest population in all three countries 54 percent in Uganda (UBOS, 2020). Yet, despite their entrepreneurial abilities, they are still the least financially educated group (Hamdan, Lehmann-Uschner and Menkoff, 2022), with limited financial knowledge (Perez-Roa et al., 2022), vulnerable to debt (Mohindra et al., 2012), with little or no savings (Dupas et al., 2018), dependent on spousal support as marriage (Bhattachanya, 2015) and least likely to own or inherit property (Demirgüç-Kunt et al., 2016).

In the labor market, women are subjected to lower pay compared to men irrespective of their skills and experience (Enhret, 2022). This sets grounds for lower savings and consistently places women in positions of potential economic need and financial vulnerability over time. Socially, women play the role of caregiving and with their meager earnings, they are more susceptible to severe financial consequences (Malapit et al., 2015). Even in cases of divorce or the death of a spouse, women may not be given a chance to inherit property. Literature shows that when empowered, women are better money managers (Seyfi et al., 2020; Klapper and Lusardi, 2019; Wooley et al., 2013; Bijli, 2012). Studies have shown that financial literacy is one way of empowering women to reach their full potential (Rawlings and Rubio, 2005, Handa and Davis, 2006; Doepke and Tertilt, 2011). These authors agree that financially knowledgeable women make good decisions in prioritizing incomes, sources, and expenses. This study is the first of its kind to assess the impact of financial literacy training using experimental games on women’s financial well-being by conducting a Randomized Control Trial (RCT). The researchers believe that unpacking the extent of the independent impact such an initiative has on a special group like women leaves the financial education mission unaccomplished.
1.2 State of Financial Literacy in Uganda

Over the past decade, the Government of Uganda (GoU) has strived to improve the levels of financial well-being of the nationals. In the early 2000s, GoU in collaboration with several international organizations launched initiatives like the “Prosperity for All scheme (locally known as Bona Bagagawale) and the National Agriculture Advisory Services Programme (NAADs). With limited realized outcomes of the mentioned programs, GoU in collaboration with the Central Bank of Uganda (BoU), German Agency for International Cooperation (GIZ), and several other stakeholders held consultative discussions to improve financial well-being through the financial literacy arm. As a result, several financial literacy programs (Rural SPEED savings, Awareness Campaign, Starting a Lifetime of Savings, Asset Africa, Empowerment, and Livelihood for Adolescents) were launched both at the institutional and country level. Most prominently, a recurring national strategy for the financial program (SFLIU) was launched in 2013. The SFLIU falls under theme 1 (financial literacy) of a three-themed financial inclusion program (2011/2016) funded and operated by GIZ and Bank of Uganda as the secretariat. The first strategy was rolled out to equip Ugandans with the necessary financial knowledge, skills, and confidence to participate in financial decision-making and improve financial inclusion levels in the country.

The SFLIU was based on five goals; 1) to improve the ability of the population to manage their finances; 2) to help equip people to protect themselves against fraud; 3) to make cost-effective use of resources that can be used to strengthen financial literacy; 4) to promote increases in the number, and improvements in the quality of initiatives to strengthen financial literacy and; 5) to facilitate effective coordination and knowledge-sharing between organizations and individuals who are working to improve financial literacy. To achieve the set goals, the various groups were targeted using five strands; 1) schools, 2) Youth, 3) Rural Outreach, 4) Workplace, and 5) Media. The 1st SFLIU ended in 2017 and the 2nd SFLIU commenced in 2019. The country-wide roll out and implementation of the 2nd SFLIU was scaled back by the outbreak of the COVID-19
pandemic in 2020 followed by two national lockdowns. Also, other than the expansion of the target strands to accommodate forcefully displaced persons (FDPs), internally displaced persons (IDPs), and children (0-15 years), the initiatives and delivery of the two strategies are largely similar. Therefore, an evaluation of financial literacy will provide for continuity into better implementation of the forthcoming recurring financial literacy strategy(ies). Nonetheless, little has been done to assess whether the named financial literacy programs have had an impact on the beneficiary’s well-being. Also, the mechanisms through which the mentioned financial literacy initiatives improve the financial well-being of beneficiaries remain unclear. For instance, the delivery of SFLIU and other financial literacy programs in the country leaves a lot to admire as it embraces the passive learning strategy, leaving out the more active and experiment-oriented training.

1.3 Motivation

This research is nested in two strands of the development economics literature. The first is the financial empowerment and financial literature, especially as they relate to female managers of microenterprises. Financial literacy interventions have been found to result in better money management, as demonstrated by various studies (Woolley, Hui, and Vincent 2013; Klapper and Lusardi 2020; Dammert, 2023). Financial literacy is seen as a crucial aspect of entrepreneurial empowerment, and financial literacy programs, both at a national and organizational level, are not uncommon. Yet their target audience and delivery methods remain inadequate. Passive learning strategies, such as lecture-based financial education sessions have been the norm in many national financial literacy programs (Banerjee et al. 2007). The second strand of literature to which our study contributes is related to the role that aspirations and other psychological factors play in escaping poverty (Bertrand et al., 2004; Haushofer and Fehr, 2014; Shilbach et al., 2016; Lybbert and Wydick, 2022). Our aspiration intervention is based on previous work using short documentaries featuring successful enterprise owners (Rojas et al., 2022; Bernard et al., 2023). Our study intentionally intersects a "hard skill" intervention—financial
literacy—with a "soft skill" intervention—aspirations—to assess their efficacy and to explore the potential of an aspirations intervention to enhance hard skills acquisition, and vice versa. This exploration into the interplay and potential complementarity or substitutability of these interventions is a distinctive and valuable contribution to the scientific discourse on skill development and behavioral change.
2 Literature Review

Our study stands out due to the incorporation of two novel elements: a gamified approach to financial literacy education and a distinctive aspirations intervention, conceptualized around the 'Aspiration Window' idea (Genicot and Ray 2017). The participants in the Aspirations group participated in an intervention where a video documentary of successful women from their community was played and where goal setting, mutual affirmation and learning exercises were held with the video documentary as reference. Moreover, in both these treatment arms we use an active intervention over the traditional classroom-styled passive approach in both the financial literacy and Aspirations treatment arms in our study. This shift is crucial because research, including studies by Stolper and Walter (2017), Sohn et al. (2012), and Willis (2009), indicate passive learning approaches have minimal effect on beneficiaries. Our active training techniques draw from the success of experimental financial education games noted in studies by Banerjee et al. (2007), Cai and Song (2017), and others, reflecting a broader trend towards interactive, engaging educational experiences.

2.1 Gamification and Financial literacy

Notably, scholars have noted the limited or no impact of passive financial literacy training on financial behavior, and overall financial well-being (Stolper and Walter, 2017; Willis, 2009; Sohn et al., 2012). As a result, this study aims to assess the impact of financial literacy on women’s financial well-being in Uganda using an active learning strategy that we refer to as gamification. The use of active training such as digital games in financial education has been extensively used in previous studies (see Patt et al., 2009; Cai and Song, 2017; Vasilaky et al., 2020; Janzen et al., 2021; Hobbs, 2021 for details). These studies have associated games with human psychological needs and behavioral patterns, and their findings have indicated that games can be used to make learning more fun and engaging without undermining its credibility. A gamification process gives users better insights into their goals, behaviors, and impact actions and is a key way to motivate them.
during the learning process.

Although the concept is new in the education space, it is built on the success of the gaming industry, social media, and decades of research on human psychology as it is deemed to reshape learning by permitting the learners to set and understand their own goals while at the same time providing timely and fair feedback. Previous studies have found mixed evidence when it comes to using gaming as a platform to enable learning and behavioral change with most of the reviewed studies indicating positive impacts. Games are fun yet challenging, requiring mastery, autonomy, and socialization which motivate the players to make self-directed and goal-oriented decisions to achieve the desired behavior. In their paper titled "From Gamification to Game Design and Game Experience in Learning" Dichev et al. (2014) acknowledge the role of games in driving people to take voluntary actions in predictive ways. After reviewing various motivational theories on learning and design that underpin the significance of gamification, the authors provide a framework for guiding a game design of skill learning units.

Suryadi et al. (2023) studied the impact of using digital simulation games in improving students' financial literacy at Bali State Polytechnic. The authors used a quasi-experimental design with purposive sampling techniques and divided 52 students into an experimental group that used digital simulation games and a control group (with no simulation). Using questionnaires assessing financial knowledge, attitudes, and behavior, the study demonstrated significant improvements in the experimental group in terms of financial knowledge, attitudes towards financial management, and financial behaviors, suggesting that digital simulation games can be an effective educational too. The study recommends that higher education institutions consider incorporating digital simulation games into their curriculum to enhance learning outcomes in financial education. Hidajat and Hidayatullah (2022) utilized a pre-test/post-test design to evaluate the impact of playing the “Cashflow 101” board game on financial literacy among high school students. Using a tool developed by Lusadi (2008) before and after game-play to assess any changes, the study found an improvement in financial literacy scores post-game.
The game’s interactive and engaging nature appeared to aid in understanding complex financial concepts.

On the contrary, the current hype around gamification has led to high expectations without rethinking certain elements; these expectations are unlikely to be met. For instance, a qualitative study by Hassan et al. (2021) investigated how game elements motivate user engagement to capture subjective experiences. With a focus on three gaming applications—Foursquare, Nike+, and Getglue. Using a diary study approach that allowed participants to record their thoughts, feelings, and reflections in real-time providing personal accounts, it was found that rewards in gamified applications (apps) were perceived as meaningless as they could not be exchanged for tangible items. The findings also showed that gamified experiences were repetitive and lacking in variety. It was also noted that game elements were viewed as extrinsic motivators and not promoting experiences. Also, most of these studies are student-based, concentrated on insurance education, carried out in developed countries, and lack a comprehensive focus on financial well-being (Pattet al., 2009; Cai and Song, 2017; Vasilakyet al., 2020; Janzen et al., 2021; Hobbs, 2021).

Vickers’ (2012) literature review paper synthesized existing research on the use of digital games as educational tools. He covered studies from various databases and included both qualitative and quantitative research to explore the advantages and disadvantages of digital gaming in educational settings. Digital games are noted for increasing motivation and engagement, fostering collaboration, and potentially leading students into the “flow” state, where optimal learning occurs. He also identified several drawbacks such as health risks like addiction and eyestrain, and potential negative impacts on learning if games are not appropriately chosen or implemented. Meanwhile, Sconti (2020) compared various studies to evaluate the effectiveness of digital versus in-person teaching methods. Just like Vickers’ (2012), this paper assessed both qualitative and quantitative research from multiple sources to conclude the comparative benefits and challenges of each teaching method. The author showed that while digital methods provide greater accessibility and
flexibility, they may lack areas requiring more hands-on interaction or personal engagement, which are better facilitated by in-person environments. Similarly, in his conceptual paper, Koskelainen (2023) outlined a research agenda for studying financial literacy in the digital age. Similarly to the earlier revised studies, this paper reviewed existing literature and identified research gaps, proposing new areas of study and methodologies that should be adopted to advance understanding in this field. The study called for empirical research to better understand the dynamic interplay between digital technology and financial behavior, suggesting areas such as digital payments and online investment platforms as points of interest.

2.2 Aspirations and Financial Literacy

Several studies have underscored the importance of psychological factors like aspirations in economic behavior, suggesting that policies aimed at enhancing individual aspirations could be effective in improving economic outcomes. For instance, in their paper titled “Understanding the determinants of Aspirations in rural Tanzania: Does financial literacy matter?” Melesse et al. (2023) focusing on aspects such as income, wealth, children’s education, and social status. The authors utilized data from over 2000 Tanzanian households and applied robust statistical analysis. Their results indicate a positive correlation between financial literacy and aspirations across multiple domains. McKenzie et al., (2021) explored how aspirations influence financial decisions by conducting a randomized experiment in the Philippines. The researcher manipulated the aspiration levels of participants through exposure to success stories and goal-setting exercises. Participants were divided into groups, with some receiving targeted interventions aimed at raising their aspirations. Subsequent financial behaviors, such as savings and investment decisions, were then monitored and analyzed. The findings suggested that higher aspirations lead to better financial decisions, as participants with elevated aspirations showed increased savings and were more likely to invest in education and health. Beutler (2012) investigated the evolution of financial aspirations from adolescence to emerging adulthood,
analyzing how these aspirations correlate with economic prosperity. The author used a qualitative approach, gathering data from various age groups (adolescents to emerging adults) about their perceptions of “living well” financially. The analysis categorized responses into intrinsic and extrinsic aspirations. Results indicate a shift from extrinsic to more intrinsic financial aspirations as individuals age, with intrinsic aspirations linked to better psychological well-being and more sustainable economic behavior. Chiapa, Prina, and Parker (2016) examined the impact of providing access to savings accounts on the educational achievements of children and the educational aspirations and expectations of their parents in 19 slums located in Pokhara, Nepal. By conducting a field experiment where access to savings accounts was randomized among a largely unbanked population, the study provided evidence that financial access can significantly improve the schooling levels of daughters and alter parental expectations and aspirations regarding their children’s education.

Also, scholars have warned against overly materialistic values within capitalist societies, suggesting that a more balanced approach to personal aspirations could lead to higher psychological well-being and social integration. For instance, Kasser and Ryan (1993) examined the psychological assessments across multiple studies, measuring the centrality of financial success in individuals’ value systems and its correlation with various indicators of mental health and social productivity. This study’s central finding is that a strong focus on financial success is associated with negative psychological outcomes such as increased stress, anxiety, and lower levels of social engagement.
3 Methodology

3.1 Research Design

Identifying and exploring this gap, we conducted a randomized control trial (RCT) of 269 rural participants from Eastern Uganda in four districts of Jinja, Iganga, Kamuli, and Busia where FINCA Uganda had operating branches. The experiment lasted for 5 weeks with a baseline survey and endline survey to measure the financial literacy levels. Our randomized study incorporated two treatments across four treatment arms: 1) the financial literacy intervention, 2) the aspirations intervention; 3) the combined financial literacy intervention and aspirations interventions; and 4) a control group. The financial literacy intervention was built around a "farm finance" game, an application that was designed by our research team of faculty and graduate students at the University of San Francisco. The app was designed with six levels and was built to play on basic smartphones and tablets. At the first level, a player is given a set amount of cash in the bank and presented with either a cow, some goats, or a flock of chickens. Each can be purchased in cash at a certain cost and has a given life expectancy, and a given productivity. As the game levels progress, borrowing is introduced, then subsequently the risk of animals dying, and then the option of investing across multiple animals. Participants played the game for at least an hour every week for five weeks.

Our aspiration intervention was based on previous work (Rojas et al., 2022; Bernard et al., 2023) and involved creating a short documentary featuring three of the most successful microentrepreneurs in the FINCA self-help group membership. Graduate students created the documentary on an Apple iPad using iMovie with high-quality video and sound and inspirational music chosen by FINCA Uganda. Those receiving the Aspirations treatment were shown the documentary and also given a five-week course intended to help participants visualize success and growth in their enterprises, goal setting, and the planning of intermediate steps to their success.

Data from the game was generated in real time at a server hosted by the University
of San Francisco. From this data, we can learn not only the impacts of the game on
financial literacy, but how they are learning since we can track the rate of distinct classes
of mistakes throughout play, such as the decision to invest in an unprofitable animal (a
Type I error), a decision not to invest in an animal when it would be profitable (Type II
error), and decisions to take on too much debt too quickly, which in the game can lead
to insolvency and having to return to the beginning of the current level.

3.2 Model specification: ANCOVA

The Analysis of Covariance (ANCOVA) was selected for this study to quantify the effects
of targeted financial literacy and aspirations interventions on Ugandan women. This
statistical method elegantly merges regression analysis and variance analysis, allowing
for the control of initial status variations in the outcomes variables—financial literacy and
aspirations indices—before estimating the impact of the interventions.

3.2.1 Mathematical representation of the model

We specify the following regression model to estimate the impacts:

\[ Y_{i1} = \alpha + \tau_1 F_i + \tau_2 A_i + \tau_3 (F_i \times A_i) + X_i' \gamma + \theta Y_{i0} + \epsilon_i \]  

(1)

Where:

- \( Y_{i1} \) represents endline outcomes related to aspirations and financial literacy.
- \( Y_{i0} \) represents these outcomes at baseline.
- \( X_i \) is a vector of controls that include age, gender, and education.
- \( \tau_1, \tau_2, \tau_3 \) represent average treatment effects from the financial literacy (\( F_i \)) and
  aspirations (\( A_i \)) treatment arms of our study.
- \( \epsilon_i \) is the error term.
3.2.2 Rationale for ANCOVA Application

ANCOVA is particularly advantageous in experimental designs like this one, where pre-existing differences among participants can potentially bias outcomes. By adjusting for these initial differences, ANCOVA not only enhances the precision of the treatment effect estimation but also improves the overall statistical power of the analysis. This approach is instrumental in ensuring that the observed effects are attributable to the interventions rather than extraneous variables or pre-intervention characteristics.
4 Results

4.1 Summary statistics

Table 1: Summary Statistics for Demographic Data

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Cum. Freq</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>174</td>
<td>64.68</td>
<td>64.68</td>
</tr>
<tr>
<td>Male</td>
<td>95</td>
<td>35.32</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>269</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td><strong>Age category in years</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>19</td>
<td>7.06</td>
<td>7.06</td>
</tr>
<tr>
<td>30-39</td>
<td>74</td>
<td>27.51</td>
<td>34.57</td>
</tr>
<tr>
<td>40-49</td>
<td>86</td>
<td>31.97</td>
<td>66.54</td>
</tr>
<tr>
<td>50-59</td>
<td>64</td>
<td>23.79</td>
<td>90.33</td>
</tr>
<tr>
<td>60-69</td>
<td>24</td>
<td>8.92</td>
<td>99.26</td>
</tr>
<tr>
<td>70-79</td>
<td>2</td>
<td>0.74</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>269</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dip.</td>
<td>9</td>
<td>3.35</td>
<td>3.35</td>
</tr>
<tr>
<td>None</td>
<td>17</td>
<td>6.32</td>
<td>9.67</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.37</td>
<td>10.04</td>
</tr>
<tr>
<td>Prim.</td>
<td>146</td>
<td>54.28</td>
<td>64.31</td>
</tr>
<tr>
<td>Sec./HS</td>
<td>92</td>
<td>34.20</td>
<td>98.51</td>
</tr>
<tr>
<td>Undergrad.</td>
<td>4</td>
<td>1.49</td>
<td>100.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>269</td>
<td>100.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Summary Statistics for Continuous Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>269</td>
<td>42.72</td>
<td>11.06</td>
<td>22.5</td>
<td>72.5</td>
</tr>
<tr>
<td>Gender</td>
<td>269</td>
<td>1.35</td>
<td>0.48</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Education</td>
<td>269</td>
<td>4.14</td>
<td>0.97</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Dependents</td>
<td>269</td>
<td>3.86</td>
<td>1.07</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Log Income</td>
<td>269</td>
<td>13.09</td>
<td>0.75</td>
<td>11.51</td>
<td>15.76</td>
</tr>
</tbody>
</table>

Tables 1 and 2 above show the demographic distribution of our respondents. From a gender lens, the proportion of females to men in our sample was almost 2:1, showing that the population from which our sample was drawn (FINCA Uganda’s clients) was likely skewed towards females. This is not surprising as FINCA Uganda has historically targeted underserved communities, particularly women, since its inception. The age
distribution indicates a middle-aged skew, with a concentration of individuals in the 40-49 age bracket. The average age (in the mid-forties), is in conjunction with the standard deviation, suggesting a bell curve-like distribution where most individuals cluster around the mean. The presence of only two individuals in the 70-79 age bracket points to a drop-off in the representation of older ages, which may be due to small populations of this age group in FINCA’s group lending model. The education levels in our sample are low with one-half of the sample having only completed the primary school level. The mean of 4.14 suggests that the average level of education falls between primary and secondary school. A standard deviation of 0.97 points to a relatively concentrated distribution around the mean. Regarding household sizes, our results show that the average number of dependents is close to 4, with a relatively small standard deviation, suggesting that most of the individuals in the sample have 3 to 5 dependents. The range indicates that there is at least one individual with no dependents and one with as many as 8 dependents, showing diversity in household sizes. Our income variable was not presented in its raw form but as its natural logarithm to address issues of right-skewed distributions that are typically observed with income data.

4.2 Index Construction

4.2.1 Financial Literacy Index

The indices representing financial literacy and aspirations were synthesized through a composite approach, capturing a spectrum of competencies, behaviors, and attitudinal dimensions. These indices were computed for both baseline and endline scenarios to facilitate the examination of temporal dynamics and intervention efficacies.

To assess the foundational quantitative skills needed in financial decision-making, we created a "numeracy sub-index". The index was articulated by collating correct responses across a suite of financial numeracy questions encompassing basic addition, subtraction, multiplication, and division. Knowledge. We also merged the assessment of respondents’ self-reported understanding of critical concepts, amalgamating perspectives on saving,
borrowing, and investment knowledge in what we called the "knowledge sub-index". We further constructed the Behavior Competency and Confidence sub-indices. These sub-indices were a product of an encoding scheme, which transmuted categorical responses to behavioral queries into standardized scores.

Each sub-index was then subject to standardization by applying the Kling Index methodology, rendering them on a comparable scale and aggregating them into a holistic Financial Literacy Index reflective of an individual’s financial acumen.

4.2.2 Aspirations Index

The aspirations index was similarly engendered from a suite of survey responses, distilled into standardized scores. The scores encompassed a range of aspirational constructs, from hopefulness and agency to envisioned pathways and objectives. The methodology here was nuanced, taking into account not only the presence of aspiration-related sentiments but also their directional intensities (both positive and negative). This nuanced approach allowed for the index to capture the dynamic nature of aspirations within the context of the individuals’ lived experiences.

4.3 Distributional analysis of Financial Literacy and Aspiration Indices

We conducted this distributional analysis to delineate the statistical narratives of financial literacy and aspirational changes induced by varied educational interventions. Hence, by synthesizing an array of financial literacy facets into indices, we evaluated the degree and nature of change across different educational initiatives.

4.3.1 Box Plot Distribution Analysis

Box plots provided a quintessential visual summary of the indices’ changes, capturing the median, interquartile range (IQR), and potential outliers in the data. In Figure 1 above, the Financial Numeracy index has a compact IQR, suggesting a general consistency in the
changes. Nonetheless, these are a couple of outliers in the index, signifying that certain individuals experienced substantial deviations from the observed median change. The Financial Knowledge Index had broad spread and far-reaching outliers, suggesting that the interventions’ impact on digital literacy is the most heterogeneous among the financial literacy indices. The Financial Behavior Index had a moderately wide IQR, hinting at differentiated responsiveness to our interventions. Both the Financial Competence and Confidence Indices showed a median shift above zero, suggesting improvements. The aspirations index showed a tighter IQR around the median, indicating a relatively uniform change in aspirations.

### 4.3.2 Kernel Density Plots Analysis

Kernel density plots offered insights into the probability density of the indices’ changes across treatment arms. The overlapping curves across the treatment arms for the Numeracy and Knowledge Indices suggest a uniform effect of the interventions. In particular,
the kernel density curves of the Financial Numeracy Index suggest that the Aspirations and the combined interventions exhibited slightly more spread, which could indicate a broader effect on financial numeracy for participants in these groups. However, we observe more variability among the treatment groups for the Digital Literacy Index. For the Financial Competency Index, we observed a very close performance among all treatment arms. For the Financial Confidence Index, the distribution curves are wide, showing variations across individuals within the treatment groups. The Aspirations Index’s curves are nearly congruent across treatment arms, yet with discernible variables at the tails.

### 4.4 Treatment Impact

The regression analysis employed in Tables 3 and 4 integrates both individual-level control variables and treatment dummy variables to discern the treatments’ distinct impacts on financial literacy and aspirations indices.
Table 3: Impact of Treatments on the Overall Financial Literacy Index

<table>
<thead>
<tr>
<th>Variable</th>
<th>Individual Financial Literacy Sub-Indices</th>
<th>Overall Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) (2) (3) (4) (5) (6) (7)</td>
<td></td>
</tr>
<tr>
<td>Game</td>
<td>0.5817*** 0.9452*** 0.0854</td>
<td>0.5009**</td>
</tr>
<tr>
<td></td>
<td>(0.1918) (0.2535) (0.1688)</td>
<td>(0.1972)</td>
</tr>
<tr>
<td>Aspirations</td>
<td>0.0783 0.7253** −0.2414</td>
<td>0.1632</td>
</tr>
<tr>
<td></td>
<td>(0.1747) (0.2891) (0.1703)</td>
<td>(0.2185)</td>
</tr>
<tr>
<td>Combined</td>
<td>0.4831 0.7423** 0.2248</td>
<td>0.4426*</td>
</tr>
<tr>
<td></td>
<td>(0.3285) (0.3125) (0.1934)</td>
<td>(0.2595)</td>
</tr>
<tr>
<td>Index base</td>
<td>0.0280 0.0730 0.1678**</td>
<td>0.2080***</td>
</tr>
<tr>
<td></td>
<td>(0.0668) (0.0707) (0.0791)</td>
<td>(0.0579)</td>
</tr>
<tr>
<td>Age</td>
<td>−0.0086 0.0022 0.0012</td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td>(0.0048) (0.0052) (0.0056)</td>
<td>(0.0046)</td>
</tr>
<tr>
<td>Female</td>
<td>−0.3186** −0.4961*** 0.0093</td>
<td>−0.5675**</td>
</tr>
<tr>
<td></td>
<td>(0.1379) (0.1361) (0.1025)</td>
<td>(0.1360)</td>
</tr>
<tr>
<td>High_Educ</td>
<td>0.1424 −0.0103 0.2705*</td>
<td>0.2587**</td>
</tr>
<tr>
<td></td>
<td>(0.1034) (0.1112) (0.1628)</td>
<td>(0.1182)</td>
</tr>
</tbody>
</table>

Number of obs 269 269 269 269 269 269 269
F(7, 261) 6.58 4.59 4.45 1.76 8.26 2.29 9.49
Prob > F 0.0000 0.0004 0.0005 0.1109 0.0000 0.0376 0.0000
R-squared 0.1104 0.1939 0.0916 0.0850 0.1490 0.0627 0.2067
Root MSE 0.9576 0.9115 0.9677 0.9712 0.9366 0.9829 0.9043

All p-values are two-tailed [*p < 0.05, **p < 0.01, ***p < 0.001].
Columns 1 to 7 represent the different financial literacy dimensions in the order of Financial Numeracy Index, Financial Knowledge Index, Digital Literacy Index, Financial Behavior Index, Financial Competence Index, Financial Confidence Index, and Overall Financial Literacy Index.

4.5 Impact of Treatment on Financial Literacy

The individual financial literacy sub-indices are consolidated into a comprehensive overall financial literacy index, forming a cohesive depiction of financial literacy improvement. Results in Table 3 shows that the game treatment demonstrated profound impact on Financial Numeracy (Coefficient = 0.581, p<0.001) and Financial Knowledge (Coefficient = 0.9452, p<0.001). These results underscore the potent role of gamified learning in boosting fundamental financial calculation skills and in-depth knowledge of financial concepts. The significant coefficient values indicate that games, through their interactive and engaging format, are particularly suited teaching core financial concepts effectively.

In the Financial Competence sub-index, the game treatment also displays a significant positive effect (coefficient = 0.3255, p<0.05). This suggests that beyond improving
knowledge and numeracy, game-based interventions positively influence participants’ ability to apply this knowledge in practical settings, enhancing their financial decision-making skills. This is a critical aspect of financial literacy as it ties theoretical knowledge to real-world application, making the learning experience more relevant and valuable. While the game treatment does not show significant effects on the Digital Literacy, Financial Behavior, or Confidence sub-indices, its impact on the overall Financial Literacy Index is positively significant (coefficient = 0.5009, p<0.001). This composite index improvement suggests that strengthening the foundations and application of financial competence. However, their limited influence on behavior and confidence highlights potential areas for further development in gamified financial education, perhaps by integrating elements that directly address these dimensions.

The Aspirations treatment significantly enhances Financial Knowledge (Coefficient = 0.7253, p<0.05) and Financial Behavior (Coefficient = 0.4842, p<0.05), indicating that focusing on personal aspirations and future goals not only boost knowledge related to finance but also positively influences practical financial behaviors. This effectiveness suggests that when individuals are encouraged to align their learning with personal goals, they not only understand financial concepts better but are also more likely to implement this knowledge in their daily financial decisions. However, the aspiration treatment does not significantly impact Digital Literacy (Coefficient = -0.214), indicating a need for specialized interventions to enhance digital skills specifically. Similarly, Aspirations do not have a significant impact on the Overall Financial Literacy Index. This suggests that while Aspirations may improve individual components, their impact may not extend broadly across all areas of financial literacy to significantly enhance overall financial understanding and money management. Put differently, while aspirations can drive targeted improvements, they may not suffice alone to produce a comprehensive enhancement in financial literacy, highlighting the potential need for integrating these with other practical and diverse educational strategies.

The Combined treatment in the study, which integrates both the digital gaming app
(Game-treatment) and Aspirations-focused interventions, shows a promising effect on improving financial literacy across various dimensions. Notably, it significantly enhances the Financial Knowledge sub-index (Coefficient = 0.7423, p<0.05), demonstrating that the synergistic approach of combining interactive learning methods with motivational content can effectively deepen understanding of financial principals. This improvement suggests that such an integrated educational framework, which merges the engagement of gameplay with the motivational boost of setting personal goals, provides a robust method for enhancing financial knowledge. The effect on Digital Literacy while positive, did not reach statistical significance (Coefficient = 0.3077), indicating that while the combined approach has potential benefits for digital literacy, it might require further refinement or a more targeted focus within the interventions to fully capture and improve these skills.

Furthermore, the Combined treatment exhibits a significant positive impact on the Overall Financial Literacy Index (Coefficient = 0.4426, p<0.05). This outcome underscores the effectiveness of a holistic educational strategy in improving general financial literacy. By integrating different teaching methods and content types, the Combined treatment not only enhances specific knowledge areas but also contributes to a more comprehensive improvements in financial literacy.

The results show that Age has a consistently non-significant effect across all financial literacy sub-indices and the overall index. This suggests that the financial literacy outcomes measured in the study are largely independent of age, implying that the treatments applied (Game, Aspirations, Combined) are equally effective or ineffective across different age groups. This could indicate that the programs are well-suited for a broad demographic or that age does not play a crucial role in the acquisition of financial literacy skills as influenced by these particular interventions. Contrary, gender largely shows significant negative effects across almost every financial literacy dimension except for Digital literacy that shows no statistical significance. This suggests that females, on average, may gain less from the interventions in terms of financial knowledge, financial numeracy, financial behavior, financial competency and financial confidence as their male
counterparts. High education attainment shows a generally positive but variably significant impact on financial literacy indices (with the exception of financial knowledge with a negative and non-significant and coefficient). This result suggests that individuals with higher educational backgrounds are likely to benefit more from the interventions in terms of digital literacy and financial confidence, perhaps due to already possessing foundational skills or greater familiarity with financial concepts that enhance their ability to absorb and utilize new information. The significant positive coefficients in these indices reflect that higher education levels correlate with better outcomes in specific aspects in financial literacy, highlighting the importance of foundational educational levels in financial education programs.

4.5.1 Impact of Treatment on Aspirations

In the pursuit of understanding the effects of our two educational interventions on the Aspirations of Ugandans, Table 4 offers ANCOVA regression analysis that quantifies these impacts. The table teases apart the nuances of how different interventions - Game, Aspirations, and combined- affect the components of the Aspirations Index, as well as the cumulative effect on the overall aspirational mindset.

This analysis is predicated on a regression framework, with control variables (age, gender, education, and log income) chosen to account for personal and economic factors that could potentially confound the treatment effects. The outcomes assessed include sub-indices reflective of individual aspirational constructs, as well as an overall aspirations index that encapsulates the broader aspirational orientation.

Table 4 shows that while the game intervention showed a directional increase in the overall aspirations index (0.1845*), it was not statistically significant, suggesting a limited standalone impact of gamification on aspirations. Further, demonstrating a robust positive coefficient, the aspiration treatment significantly (0.2143*) uplifted the overall index. This underscores the intervention’s pivotal role in enhancing specific aspirational facets targeted by the intervention. Interestingly, the combined intervention’s effect on
Table 4: Impact of Treatments on the Aspirations Index

<table>
<thead>
<tr>
<th>Variable</th>
<th>Aspirations Sub-indices</th>
<th>Overall Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Game</td>
<td>0.1845</td>
<td>−0.0108</td>
</tr>
<tr>
<td></td>
<td>(0.1549)</td>
<td>(0.2022)</td>
</tr>
<tr>
<td>Aspirations</td>
<td>0.2713*</td>
<td>0.2288</td>
</tr>
<tr>
<td></td>
<td>(0.2140)</td>
<td>(0.1811)</td>
</tr>
<tr>
<td>Combined</td>
<td>0.1092</td>
<td>−0.1308</td>
</tr>
<tr>
<td></td>
<td>(0.1997)</td>
<td>(0.1806)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0043</td>
<td>0.0067</td>
</tr>
<tr>
<td></td>
<td>(0.0057)</td>
<td>(0.0057)</td>
</tr>
<tr>
<td>Female</td>
<td>−0.1174</td>
<td>0.0352</td>
</tr>
<tr>
<td></td>
<td>(0.1574)</td>
<td>(0.1337)</td>
</tr>
<tr>
<td>High Educ</td>
<td>0.1582</td>
<td>0.2265</td>
</tr>
<tr>
<td></td>
<td>(0.1152)</td>
<td>(0.1140)</td>
</tr>
<tr>
<td>Log Income</td>
<td>−0.0179</td>
<td>−0.1229</td>
</tr>
<tr>
<td></td>
<td>(0.0908)</td>
<td>(0.1016)</td>
</tr>
<tr>
<td>Index Base</td>
<td>0.0831</td>
<td>0.0724</td>
</tr>
<tr>
<td></td>
<td>(0.0589)</td>
<td>(0.0659)</td>
</tr>
<tr>
<td>Constant</td>
<td>−0.0999</td>
<td>1.1673*</td>
</tr>
<tr>
<td></td>
<td>(1.1760)</td>
<td>(1.3295)</td>
</tr>
</tbody>
</table>

Observations 269 269 269 269
F(7, 261) 5.39 7.75 2.19 5.83
Prob > F 0.0000 0.0000 0.0357 0.0000
R-squared 0.1080 0.1798 0.0469 0.1289
Root MSE 0.95703 0.91769 0.98926 0.38736

All p-values are two-tailed [*p < 0.05, **p < 0.01, ***p < 0.001].
Columns 1 to 4 represent the different Aspirations dimensions in the order of the Hope Index, Agency Index, Pathways Index, and Overall Aspirations Index.

The overall aspirations index is not statistically significant (0.1932). This might suggest that while both treatments are individually effective, their combined impact does not statistically exceed the sum of their separate effects.

For control variables, neither age nor gender (female) shows a statistically significant impact on the overall aspirations index. A positive and significant coefficient for higher education on the overall index suggests that participants with higher education backgrounds are more responsive to aspirations interventions. Income (log income), was found to be non-statically significant, suggesting that within the sample, the level of income does not significantly influence the aspirational impact of the interventions.
5 Discussion

Incorporating insights from a comprehensive literature, the results of our study on the impact of gamified and aspirations-based interventions on financial literacy provide both corroborating evidence and new perspectives to the existing body of knowledge on financial educational strategies. Here, we delve deeper into how our findings align with or deviate from previous research, offering a nuanced discussion on the implications and insights garnered.

5.1 Gender and Financial literacy

The impact of gender on financial literacy outcomes in our study provides a crucial dimensions for analysis, especially when contextualized within the broader literature that often examines gender differences in educational and behavioral interventions. Our findings reveal a significant negative effect on being female on most of the measured dimensions of financial literacy. These findings suggest that females, on average, may benefit less from the financial literacy interventions compared to their male counterparts. This result is particularly concerning at it indicated potential barriers that females might face in educational settings, which could stem from various factors including societal, psychological, and pedagogical influences. This observed gender disparity aligns with broader educational research that often reports varying outcomes based on gender. For instance, studies have shown that educational interventions might not be equally effective for all genders due to differences in learning styles, engagement, and even the content’s relevance to the participant’s personal experiences and expectations. Our study echoes the research by Lusardi and Mitchell(2006) highlighting the unique financial literacy challenges women face, and further, the work of Seyfi et al.(2022), emphasizing the need for gendered approaches in empowerment programs. However, the interventions applied here seem to have bridged this gap, an outcome that may stem from the contextual design of the interventions that addressed the specific needs and constraints faced by women, an aspect that is crucial in the discussions by Klapper and Lusardi(2020) and Singh and
Kumar(2017). However, our findings contrast with some segments of financial literacy research, such as those by McKenzie et al. (2021), which do not necessarily highlight gender as a significant determinant of financial education’s effectiveness. This discrepancy underscores the need for a deeper exploration of how gender-specific factors influence learning outcomes in financial literacy programs.

5.2 Educational attainment and Aspirational Impact

The significant correlation between higher education attainment and improved financial literacy indices supports the arguments of Lupton and Kintrea (2011) and adds a tangible dimension to the conversation on education as a catalyst for financial empowerment. The substantial receptivity of individuals with higher education to the interventions may reflect the cumulative effect of education in enabling individual processes and applying complex information, as suggested by the work of McKenzie and Woodruff (2014).

5.3 Financial literacy through game-based learning

The exploration of game-based learning within our study reveals significant contributions to financial literacy, particularly in the areas of Financial Numeracy and Financial Knowledge, Financial Behavior and in the Overall Financial Literacy Index with profound implications for the design and implementations of financial education programs. Our study findings, showing a significant impact of gamified intervention on numeracy and knowledge corroborate a growing body of literature that identifies active learning strategies as more effective than traditional, passive approaches. For instance, Cai and Song (2017) and Patt et al. (2009) have documented the positive effects of game-based learning in engaging users and improving their learning outcomes through interactive and dynamic content. This approach resonates with the psychological engagement theories posited by Dichec et al. (2014), which suggest that gamification meets basic human needs for competence, autonomy, and relatedness, this fostering a deeper and more effective learning process. The difference in effect size, when compared to the cautionary tones of Dupas et
al. (2018), could be due to the nature of the gamification employed in our study, which has provided a more direct and tangible connection to financial concepts than the abstract banking concepts discussed in their work. Additionally, the context-specific design, which took into account the local economic activities, provided a practical anchor for participants, thereby enhancing the learning experience and retention, a factor not extensively explored in McKenzie’s reassessment of business training effectiveness (2021).

Conversely, our study extends these findings by highlighting the specific financial literacy components most amenable to gamification. While previous studies have broadly endorsed the efficacy of gamified learning, our results provide a nuanced understanding by pinpointing where these interventions make the most impact - namely, in improving basic numeracy skills and the comprehension of financial concepts. This specificity is somewhat lacking in broader discussions within the literature, which often do not dissect the differential impacts of gamification across various dimensions of financial literacy.

5.4 Aspirations and Financial Literacy

The application of aspirations-based interventions in our study also offers significant insights into their potential and limitations in enhancing financial literacy. As shown in our findings, the aspirations-based intervention significantly boosts financial knowledge and financial behavior. This corresponds well with McKenzie et al. (2021) who noted that elevated aspirations can lead to improved financial decisions. The mechanism here is likely similar; by engaging with aspirational content and success stories, participants may see more clearly the practical benefits of financial knowledge; thus motivating them to apply what they learn in ways that alter their financial behaviors positively. However, our study also uncovers limits to the effectiveness of aspirations-focused interventions. Despite significant improvements in specific areas, these interventions did not enhance the Overall Financial Literacy Index or Digital Literacy. This contrasts with findings from Melesse et al. (2023), who reported a positive correlation across broader financial literacy dimensions influence by aspirations. This divergence suggests that while aspirations can
enhance certain targeted outcomes, their influence may not extend to all areas of financial literacy, particularly in digital literacy, which is becoming increasingly crucial in the modern financial landscape.

One critical insight from our results is the apparent necessity for integrating specific skill-building activities into aspirations-driven programs, especially those aimed at enhancing digital literacy. This is to say that Aspirations can effectively motivate and improve behavior and knowledge, but without the skills necessary to navigate digital financial platforms, the utility of these improvements might be limited. This insight suggests a gap in our current application of aspiration intervention, pointing to the necessity of a more comprehensive approach that includes digital skills training. Furthermore, the success in boosting financial knowledge and behavior shows the effectiveness of motivational and psychological engagement in learning, supporting the idea that financial education should not just inform but also inspire. This approach aligns with the broader educational theories that advocate for holistic learning experiences that engage learners not only intellectually but also emotionally and socially.

Our results regarding the combined treatment of gamification and aspirations-based intervention reveal a multifaceted impact on financial literacy, substantiating the hypothesis that integrative educational strategies can significantly enhance learning outcomes. In line with educational theories advocated by Vickers (2012) and Sconti (2020), our study’s combined treatment approach illustrates that employing a mix of pedagogical methods can cater more effectively to diverse learning needs. Vickers highlighted the advantages of digital games in educational settings, such as increased motivation, engagement, and the potential to lead students into a state of ’flow’, where optimal learning occurs. Similarly, Sconti emphasized the comparative benefits of digital over in-person teaching methods, noting the greater accessibility and flexibility provided by digital platforms. Our study builds upon these foundations by demonstrating that combining digital gamification with motivational aspirations interventions leads to enhanced financial knowledge and overall literacy, albeit with varying degrees of impact across different literacy components.
5.5 Aspirations intervention and Socio-economic agency

The enhancement of the aspirations index through targeted interventions aligns with Genicot and Ray’s (2017) indicates that aspirations are a pivotal component of socio-economic behavior. Our study empirically substantiated their theoretical model by linking aspiration-focused educational content with improved financial planning and decision-making. This finding concurs with the perspective of Lybbert and Wydick (2018), who explore the economics of hope, suggesting that nurturing aspirations can yield tangible economic behaviors and outcomes. Contrastingly, the non-significant impact of the combined treatment on the overall aspirations index presents a curious divergence from expected outcomes. This could imply that when it comes to aspirations, there might be an optimal level of intervention beyond which additional input does not translate into further growth, a possibility not directly addressed in the literature. This notion can be further explored by comparing the outcome with Lupton and Kintrea’s (2011) findings, which indicate the malleability of the aspirations when community-based interventions are applied.
5.6 Conclusions

A critical insight from our study is that while gamification significantly boosts knowledge and skills in numeracy and financial understanding, its effects are less pronounced on indices such as Financial competence and confidence. Hence, gamified learning, while potent in engaging learners and enhancing their knowledge gains into behavioral changes and improves self-efficacy in financial contexts. This revelation is crucial as it highlights the limits of gamification and the need for holistic educational strategies that also address applications and confidence in financial decision-making. The lesson here is clear is that educational interventions especially in contexts requiring behavioral change like financial literacy, must be multifaceted. Gamification should be part of a broader pedagogical approach that also includes direct training on behavior modification techniques, perhaps through simulation-based learning or scenario-based strategies, which are shown to enhance decision-making capabilities in real-life situations.

While aspirations-based intervention in our study demonstrated a clear benefit in enhancing financial knowledge and behavior, their limited impact on broader financial literacy capabilities, especially in digital literacy, suggests the need for these programs to evolve. By incorporating comprehensive skill sets and continuing to leverage the motivational power of aspirations, future financial literacy initiatives can achieve far-reaching outcomes.

The game-based learning approach adopted in the financial literacy intervention notably increased by 0.50σ, indicating a marked improvement in participants’ understanding of financial numeracy and knowledge. Furthermore, the aspiration treatment elicited a significant elevation of the aspiration index by 0.38σ, reinforcing past scholars’ theory that aspirations are integral to socioeconomic advancement.

Interestingly, the combined treatment arm’s impact on financial literacy was less pronounced than the financial literacy intervention alone, a divergence from the anticipated outcomes suggesting that an optimal level of intervention might exist for aspirations enhancement. This finding invites further exploration into the optimal balance and interac-
tion between educational interventions that address both financial skills and aspirational attributes.

The research underscores the potential of digital platforms in transcending traditional barriers to financial education and entrepreneurial development. It demonstrates that interventions tailored to the local economic and cultural context can effectively bridge gender gaps in financial literacy and entrepreneurship. By leveraging technology and contextually relevant content, the study contributes actionable insights into scalable strategies for women’s economic empowerment.

5.7 Limitations

While the study provides significant insights, the relatively small sample size limits the generalizability of the findings. Extending the research to a larger, more diverse population could help validate the results across different demographic groups and regions. The reliance on self-reported data could introduce biases affecting the accuracy of the findings. Future studies could incorporate more objective measures of financial behavior to enhance the reliability of the data. The short duration of follow-up may not capture the long-term effects of the interventions on financial literacy and aspirations. Longer-term studies are necessary to understand the sustainability of the observed effects. The study may not have accounted for all potential confounding variables that could influence financial literacy and aspirations, such as prior exposure to financial education or inherent motivational levels. The interventions were designed specifically for the context of Uganda and may not be directly applicable to other settings without modifications that consider local cultural, economic, and social contexts.

5.8 Implications for Future Research and Practice

The implications of these findings are significant for both educators and policymakers. First, there is a clear mandate to integrate gamified learning into financial literacy curricula but to do so as part of a comprehensive suite of learning tools. Educational pol-
icymakers should consider curricula that combine the engaging aspects of gamification with practical, hands-on training in financial management to enhance both the acquisition of knowledge and its application. Moreover, for future research, there is a rich avenue to explore regarding how different components of financial literacy can be most effectively targeted by specific types of gamified learning. Further, studies could, for example, investigate the differential impacts of various game mechanisms (competition vs. collaboration, immediate vs. delayed rewards) on different demographic groups or cultural contexts, exploring how these factors influence the efficacy of gamification. Additionally, the integration of more sophisticated digital tools and artificial intelligence in game design could offer personalized learning pathways that adapt to individual performance and preferences, potentially increasing the effectiveness of gamified learning in financial education.

For practitioners, aspirations-based interventions should be part of a broader pedagogical strategy that includes robust training in digital literacy. This would ensure that the motivational gains from aspirations interventions are complemented by practical skills, particularly those that are increasingly indispensable in a digitized global economy. For researchers, our study highlights an opportunity to further explore how different components of aspirations-based intervention (such as personal goal setting, exposure to success stories, and community engagement) individually and collectively impact various dimensions of financial literacy. Additionally, examining the interplay between digital literacy training and aspirations could yield valuable insights into how to design more effective integrated interventions.

Implementing longitudinal research designs would provide valuable insights into the long-term impacts of financial literacy and aspirations interventions, helping to observe changes over time and the sustainability of the effects. Conducting comparative studies across countries or within different regions of a country could shed light on the contextual factors that influence the effectiveness of financial literacy programs. Further investigation into the psychological and behavioral changes prompted by financial education could
provide a deeper understanding of how these changes influence financial decision-making and economic outcomes.
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Poverty 1:409–21.


Vasilaky, Kathryn, Rahel Diro, Michael Norton, Geoff McCarney, and Daniel Osgood.


Financial Literacy Questionnaire

Respondent first name:.............................................

Respondent last name:.............................................

ID: _____

Respondent age (age bracket):..............................

1. Do you receive any income?
   a. Yes
   b. No

2. What did you say your source of your income was? (Select all that applies)
   a. Self-employment
   b. Daily Wages for Casual/Contractual Jobs
   c. Agriculture or Cattle rearing
   d. Government schemes or pensions
   e. Gifts from friends or family
   f. Others? (Specify)

3. In the last couple of weeks, has there been a change in your source of income?
   a. Yes
   b. No

4. If the answer in 3 above is YES, Explain:.............................................

Financial knowledge questions

1. How would you rate your current understanding of saving?
   a) Very low,
   b) Low,
   c) Moderate,
   d) High,
   e) Very high

2. How would you rate your current understanding of borrowing?
   a) Very low,
   b) Low,
   c) Moderate,
   d) High,
   e) Very high

3. How would you rate your current understanding of investing?
   a) Very low,
   b) Low,
   c) Moderate,
   d) High,
   e) Very high

4. Imagine that five brothers are given a gift of UGX/INR500. If the brothers must share the money equally, how much does each one receive? _______________(1=right answer | 0 = wrong answer)
5. Now imagine that the brothers have to wait for one year to get their share of the UGX/INR500 and inflation stays at 5% percent. In one year's time will they be able to buy:
   a) More with their share of the money than they could today
   b) The same amount
   c) Less than they could buy today
   d) It depends on the types of the things that they want to buy
   e) I am not sure

6. Suppose you lend UGX/INR500 to a <friend/acquaintance> one evening and he gives you UGX/INR25 back the next day. How much interest has he paid on this loan?.............................(1= right answer | 0 = wrong answer)

4. Imagine that someone puts UGX/INR 2000 into a <no fee, tax free> savings account with a guaranteed interest rate of 2% per year. They don’t make any further payments into this account, and they don’t withdraw any money. How much would be in the account at the end of the first year once the interest payment is made?
   a) More than there was in the beginning
   b) The same amount; or
   c) Less than there was in the beginning
   d) I don’t know

7. And how much would be in the account at the end of five years? Would it be:
   a) More than UGX/INR 2200
   b) Exactly UGX/INR 2200
   c) Less than UGX/INR 2200
   d) impossible to tell from the information given
   e) I don’t know how to calculate it

I am now going to read out some statements. I would like to know whether or not you do the following:

8. In the last 5 weeks, have you borrowed money?
   a. Yes
   b. No

9. If yes, have you looked at, considered or compared interest rates before borrowing a loan?
   c. Yes
   d. No

10. In the last five weeks, have you saved money?
    e. Yes
    f. No

11. If yes, where have you been saving?
    a. Wallet
    b. Home
c. Financial Institution
d. Self-help groups or informal groups
e. Others
f. If others, specify: ______

12. If financial institution was selected: Did you look at, consider or compare interest rates before saving your money in a financial institution?
   a. Yes
   b. No

13. Do you not assess risk before you make an investment?
   a. Yes
   b. No

14. A friend of yours offers to sell you 20 chickens for 10000 UGX/INR which earns you (if bought) on an average 5000 UGX/INR per year. The goat is already 8 years old and will be alive for the next 2 years. You need to spend UGX/INR 1000 per year to take care of the goat.
   g. Do you think it’s a good investment?
      i. Yes/No
   h. Imagine the goat is just 7 years old and will live for another 3 years. Do you think it’s a good investment?
      i. Yes/No
   i. Imagine the goat is just 5 years old and will live for another 5 years. But due to inflation, you need to spend UGX/INR 1500 for taking care of the goat. Do you think it’s a good investment?
      i. Yes/No

15. A neighbor offers to sell you a cow for UGX/INR 15000, and it can generate an average income of UGX/INR 6000 per year if you own it. The cow is already 10 years old and has an expected lifespan of 5 more years. However, you will need to spend UGX/INR 500 per year for its care. Now, if you borrow a loan to purchase the cow at 20% interest rate for 5 years.
   j. Is this a good investment?
      i. Yes/No/I don’t know
   k. Imagine that interest goes down to 10%. Do you think that it’s a profitable investment?
      i. Yes/No/I don’t know

16. A relative is selling a cow to you for UGX/INR 10000, and it can provide an annual income of UGX/INR 4000 if you own it. The cow is also currently 10 years old and is expected to live for another 4 years. However, you will need to spend UGX/INR 500 per year for its maintenance. Now, if you borrow a loan to purchase the cow at 10% interest rate for 4 years;
   l. Do you think it’s a good investment?
      i. Yes/No
   m. Imagine that the cow is just 7 years old and will live for another 7 more years. The loan will also be for 7 years at 10% interest rate. Do you think it’s a profitable investment?
17. Imagine you receive an unconditional cash transfer of UGX/INR 20000, and you have two options:

n. Option 1: Buy a cow for UGX/INR 20000, and it can generate an average income of UGX/INR300 per year if you own it. The cow is already 10 years old and has an expected lifespan of 5 more years. However, you will need to spend UGX/INR 1000 per year for its care.

o. Option 2: Instead of purchasing a cow, you have the option to save your money in a bank account that offers an annual interest rate of 5%. You can deposit the same amount that you would spend on purchasing a cow.
   i. Which one amongst them is a better profitable investment? Option 1 or 2?
   ii. Imagine that the cow is just 5 years old and is expected to live for another 10-12 years. Which one is a better profitable investment? Option 1 or 2?

18. You are part of a self-help group consisting of 15 women who collectively invest in a business initiative. The total investment made by the group is UGX/INR 30,000, and the group expects the investment to double in value over a period of 2 years. The profits generated will be equally distributed among the group members. You have two options for investing in this initiative:

p. Option 1: The self-help group can borrow the required funds with an annual interest rate of 20% from FINCA/SKDRDP. The loan will be repaid from the profits generated by the business initiative.

q. Option 2: You have personal savings of UGX/INR 10,000, and you can choose to use half of your savings by investing it in the business initiative.
   i. Which one amongst them is a better profitable investment?
   ii. Imagine that the rate of interest went down to 10%. But you only have UGX/INR 2000 in savings. In order to invest you can either exhaust your savings or borrow. Which one is a better choice now?

19. Do you make day-to-day decisions about how you use your money?

   a. Yes
   b. No
   c. Don’t Know
   d. Prefer not to answer

20. Who makes day-to-day decisions about how to use money in your household?

   A. I make the decision myself
   B. I make the decision with someone else in the household
   C. Someone else makes the decision
   D. Don’t know
   E. Prefer not to answer

21. How confident do you feel in making financial decisions?

   a) Not at all confident,
   b) Slightly confident,
   c) Moderately confident,
d) Very confident,  
e) Extremely confident

22. How often do you engage in financial discussions with others, such as family members or friends?
   a) Never  
   b) Rarely  
   c) Occasionally  
   d) Frequently  
   e) Very frequently

23. Please indicate your level of familiarity and usage of digital learning tools:
   a) Not familiar at all and never used  
   b) Not very familiar and rarely used  
   c) Moderately familiar and occasionally used  
   d) Quite familiar and frequently used  
   e) Very familiar and extensively used

24. Do you do any of the following for yourself or your household?

<table>
<thead>
<tr>
<th>Options</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make a plan to manage your income and expenses</td>
<td></td>
</tr>
<tr>
<td>Keep a note of your spending</td>
<td></td>
</tr>
<tr>
<td>Keep money for bills separate from day-to-day spending money</td>
<td></td>
</tr>
<tr>
<td>Make a note of upcoming bills to make sure you don't miss them</td>
<td></td>
</tr>
<tr>
<td>Use a banking app or money management tool to keep track of your outgoings</td>
<td></td>
</tr>
<tr>
<td>Arrange automatic payments for regular outgoings</td>
<td></td>
</tr>
</tbody>
</table>

25. In the past 12 months have you been [personally] saving money in any of the following ways?

<table>
<thead>
<tr>
<th>Options</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving Cash at your home or your wallet</td>
<td></td>
</tr>
<tr>
<td>Savings account in a bank or financial institutions</td>
<td></td>
</tr>
<tr>
<td>Giving money to your family to save on your behalf</td>
<td></td>
</tr>
<tr>
<td>Savings in Self Help Groups or informal savings clubs</td>
<td></td>
</tr>
</tbody>
</table>
26. If you, personally, faced a major expense today – equivalent to your own monthly income – would you be able to pay it without borrowing the money or asking family or friends to help?

A. Yes  
B. No  
C. Don’t know  
D. Prefer not to answer

27. If you, personally, faced a major expense today – equivalent to your own monthly income – how confident are you about raising money for the purpose if given a day’s time?

A. Very Confident (I can manage to raise the full amount)  
B. Confident (I can manage somewhere around 70%)  
C. Somewhat confident (I can manage at least 50%)  
D. Not very confident (I can manage somewhat 25%)  
E. Not at all confident (Can’t raise anything at all)

28. Some people set themselves financial goals, such as paying for kids’ education, buying a vehicle or becoming debt free. Do you (personally, or with your spouse/partner) have any financial goals?

A. Yes  
B. No  
C. Don’t Know  
D. Prefer not to say

29. I am now going to read out some statements. I would like to know if you agree or disagree with each of these statements (as it relates to you)?

<table>
<thead>
<tr>
<th>Options</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>I find it more satisfying to spend/investing money than to save it</td>
<td>Yes</td>
</tr>
<tr>
<td>for the long term</td>
<td>No</td>
</tr>
<tr>
<td>I am prepared to risk some of my own money when saving or making an</td>
<td></td>
</tr>
<tr>
<td>investment</td>
<td></td>
</tr>
<tr>
<td>Money is there to be spent</td>
<td></td>
</tr>
<tr>
<td>I am satisfied with my present financial situation</td>
<td></td>
</tr>
<tr>
<td>My financial situation limits my ability to do the things that are</td>
<td></td>
</tr>
<tr>
<td>important to me</td>
<td></td>
</tr>
<tr>
<td>I keep a close personal watch on my financial affairs</td>
<td></td>
</tr>
<tr>
<td>I have too much debt right now</td>
<td></td>
</tr>
<tr>
<td>If I borrow money, I have a responsibility to pay it back</td>
<td></td>
</tr>
</tbody>
</table>
I will now read out some statements, what do you feel about these?

<table>
<thead>
<tr>
<th>Options</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important to calculate interests of a loan and assess returns from an investment before borrowing.</td>
<td></td>
</tr>
<tr>
<td>It’s good to save when savings rate is low and investment yield is perceivably high</td>
<td></td>
</tr>
<tr>
<td>An investment is optimal when some of your neighbors or community members adopt it regardless the risk involved</td>
<td></td>
</tr>
<tr>
<td>It is okay to borrow multiple loans at the same time for short time</td>
<td></td>
</tr>
<tr>
<td>If savings are too low, it is better not to borrow too much loans even if the borrowing interest rate is less</td>
<td></td>
</tr>
<tr>
<td>One should take a higher risk investment only if they have enough savings</td>
<td></td>
</tr>
<tr>
<td>Borrowing under any circumstances is bad</td>
<td></td>
</tr>
</tbody>
</table>
**Aspirations questions**

*Answered on a scale of 0-10 (0 being not at all, 10 being the most possible)*

1. General Happiness: “All things considered, how happy would you say you are today?” (0-10) ___

2. General Optimism: “All things considered, how hopeful do you feel about the future?” (0-10) ___

A. Three Components of Hope

1. Aspirations and Goals: 5 questions. On a scale of 0-10, how much do you agree with the following statements (0-do not agree at all, 10-perfectly describes me)

   a) Agree (0-10): It is better to learn to accept the reality of things than to dream for a better future.

   b) Agree (0-10): It is better to have aspirations for your life than to accept each day as it comes.

   c) Agree (0-10): I am satisfied with my current income and spending levels.

   d) Agree (0-10): It is wiser to establish goals than to address situations as they arrive.

   e) Agree (0-10): I have specific goals and plans for my future income.

2. Agency and Self-Efficacy: 5 questions

   a) I am now going to read out some statements. I would like to know how important you think each concept is to success (0-not important at all, 10 extremely important)

   1. On a scale of 0 to 10 how important is hard work to prosper in making money? (0-not important at all, 10 extremely important)

   2. On a scale of 0 to 10 how important is being lucky to prosper in making money? (0-not important at all, 10 extremely important)

   3. On a scale of 0-10, how much do you agree with the following statements (0-do not agree at all, 10-perfectly describes me)

      a) Agree (0-10): My future is shaped mainly by my own actions rather than by the actions of others.

      b) Agree (0-10): I often have difficulty leading and influencing my friends and neighbors.

      c) Agree (0-10): Women like me can help bring about positive change in our community.

3. Avenues/Pathways: 5 questions

   On a scale of 0-10, how much do you agree with the following statements (0-do not agree at all, 10-perfectly describes me)

   a) Agree (0-10): I can find a way to solve most problems.

   b) Agree (0-10): If my income goes down, I know how to explore new opportunities to bring it up.
c) Agree (0-10): I become discouraged easily when I encounter obstacles in making money.

d) Agree (0-10): I know people who I look to as positive examples in how to increase my income level.

e) Agree (0-10): I understand the different ways and opportunities to increase my income level.

4. **Future-Orientation: 3 questions**

On a scale of 0-10, how much do you agree with the following statements (0-do not agree at all, 10-perfectly describes me)

a) Agree (0-10): When I have a chore, I do it immediately rather than putting it off for later.

b) Agree (0-10): It is far more important to enjoy life today than to make sacrifices for tomorrow.

c) Agree (0-10): I use my extra income more for investment or savings than extra personal spendings.