

Financial Literacy and Financial Well-being of Australian Consumers: A Moderated Mediation Model of Impulsivity and Financial Capability

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Abstract

Purpose – We test a moderated mediation model for a twofold purpose. First, to examine the mediating role of financial capability (FC) in the association between financial literacy (FL) and financial well-being (FW). Second, to analyze if non-impulsive future-oriented behavior (NIB) moderates the associations of FL with FC and FL with FW.

Design/methodology/approach – We use the PROCESS macros in IBM SPSS Statistics to test the moderated mediation model and analyze the 2016 wave of the Household, Income and Labour Dynamics in Australia Survey.

Findings – The empirical analysis shows that FC partially mediates the association between FL and FW. Furthermore, the moderated mediation analysis shows that NIB strengthens the associations of FL with FC and FL with FW. Specifically, the positive associations of FL with FC and FL with FW significantly increase for those consumers who score high on NIB.

Practical implications – The findings have implications for the financial services industry. Professional financial planners can positively improve the ability of consumers to deal with their financial matters by highlighting the importance of FL and NIB.

Social implications – Our findings suggest educating consumers to discourage impulsive behavior and encourage them to create financial plans as it will enhance their ability to conduct financial tasks efficiently, improving their FW.

Originality/value – To our knowledge, this is the first study to assess a moderated mediation model, which examines the role of FC as a mediator variable and NIB as a moderator variable in the association between FL and FW.

Keywords

HILDA; financial literacy; financial well-being; financial capability; impulsivity

Paper type

Research paper

1. Introduction

Financial well-being, one's perception of personal current and future financial condition (Brüggen *et al.*, 2017), is an emerging research domain that is gathering the attention of researchers worldwide. Financial literacy, which includes the knowledge of basic financial concepts such as interest, inflation, and the time value of money (Lusardi and Mitchell, 2011), is often directly associated with higher levels of financial well-being (Lee *et al.*, 2020; Limbu and Sato, 2019). However, recent studies find factors (locus of control, attitude towards money, and financial behavior) that may explain or attenuate the direct association between financial literacy and financial well-being (Utkarsh *et al.*, 2020; Mahdzan *et al.*, 2019; Riitsalu and Murakas, 2019). The outcomes of these recent studies suggest that promoting financial literacy may not be an effective tool to raise the levels of consumer financial well-being. Other research argues that the ability of consumers to apply their prior financial knowledge and to conduct financial tasks, referred to as financial capability (Curley *et al.*, 2013; Sherraden, 2013), matters more than their prior financial knowledge (Kempson *et al.*, 2017) in achieving higher levels of financial well-being. The reason behind this argument is that financial capability involves the 'ability to act' and 'opportunity to act' (Sherraden, 2013), which are antecedents to improve one's financial well-being (Goyal and Kumar, 2021). Hence, the practical aspect of financial capability makes this concept distinct from financial literacy and opens new pathways for researchers to examine if financial capability plays a dominating role to improve one's financial well-being. Unlike prior research (Xiao *et al.*, 2014; Xiao and O'Neill, 2016; 2018; Xiao and Porto, 2017), this paper explores the dominance of financial capability by examining if financial capability

completely or partially mediates the association of financial literacy with financial well-being.

Prior studies report that those who plan for the future and set long-term goals are more likely to be financially satisfied (Xiao and O'Neill, 2018). Similarly, high financial literacy skills are often related to the high quality of financial decisions that improve consumers' financial well-being (Bourova *et al.*, 2018; Lusardi and Mitchell, 2014; Limbu and Sato, 2019).

However, consumers' impulsive behavior could have an adverse effect on financial decisions (Ottaviani and Vandone, 2011; 2018), deteriorating their financial well-being. Impulsivity refers to an individual's action performed without any prior plan in mind and without thinking of the negative consequences of such an action (Frigerio *et al.*, 2020).

Impulsive consumers can make non-rational sub-optimal financial decisions as they ignore future-orientation and do not have a propensity to plan (Frigerio *et al.*, 2020). Frigerio *et al.* (2020) link impulsivity to the concept of 'hyperbolic discounting'. Hyperbolic discounting is a psychological bias, which argues that impulsive consumers are short-term oriented people who ignore long-term or future-orientation while making current financial decisions (Frigerio *et al.*, 2020). Research finds that impulsive behavior attenuates the association between high financial literacy and lower debt-burden (Ottaviani and Vandone, 2018), concluding a statistically significant positive relationship between impulsivity and over-indebtedness (Frigerio *et al.*, 2020). However, no other research has explored the moderating role of non-impulsive future-oriented behavior (NIB) in the associations of financial literacy with financial capability and financial literacy with financial well-being.

This paper has a twofold purpose of contributing to the existing knowledge: (1) to find if financial capability mediates the association between financial literacy and financial well-being, and (2) to explore if NIB strengthens (moderates) the associations of financial literacy with financial capability and financial literacy with financial well-being.

To meet the objectives of this paper, we analyze Australian consumers' financial well-being using the Australian nationally-representative dataset, namely the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Our results highlight that (1) financial capability partially mediates the positive association between financial literacy and financial well-being, and (2) NIB strengthens the positive associations of financial literacy with financial capability and financial literacy with financial well-being. In other words, we find that the positive associations of financial literacy with financial capability and financial literacy with financial well-being occur for only those consumers who score high on NIB. Whereas, when low levels of NIB exist, the associations of financial literacy with financial capability and financial literacy with financial well-being are not statistically significant. Our findings have policy implications, suggesting that future-orientation and non-impulsive behavior are relatively more important to improve consumers' financial condition and their level of financial well-being. We recommend that financial literacy curricula should be designed in a way that could discourage impulsive behavior and assist people in making long-term financial goals.

Next, we review relevant existing research, explain the dataset and method of data analysis, show empirical results, discuss these results, explain possible implications, and conclude with a direction for future research.

2. Literature review and hypotheses formation

2.1 Financial literacy, financial well-being, and the mediating role of financial capability

At the start of the twenty-first century, researchers emphasized the importance of making consumers financially literate to develop effective money-management skills and improve their financial well-being (Johnson and Sherraden, 2007). To date, extensive research has been conducted to explore financial literacy worldwide (Brackin, 2014; OECD, 2017;

Worthington, 2013). Researchers examine the relationship between financial literacy and different concepts related to financial decisions. Financial literacy is associated with improved financial behavior (Barbić *et al.*, 2019), better basic money-management and financial planning skills (Ali *et al.*, 2015), the development of the ability to avoid consequences of default (Bourova *et al.*, 2018), and retirement planning (van Rooij *et al.*, 2011).

A consensus exists that the ultimate aim of financial literacy is to improve consumers' financial well-being (Limbu and Sato, 2019; Pahlevan Sharif *et al.*, 2020). However, recent research undertakings show inconsistent findings on the association between financial literacy and financial well-being, with results showing a positive relationship (Lee *et al.*, 2020), a negative relationship (Mahdzan *et al.*, 2019), weak relationship (Riitsalu and Murakas, 2019), and no relationship (Utkarsh *et al.*, 2020). These inconsistent results in empirical studies highlight a need to explore indirect associations between financial literacy and financial well-being. Limbu and Sato (2019) argue that a direct association between financial literacy and financial well-being may not exist. Instead, there may be some intervening factors indirectly creating a link between financial literacy and financial well-being.

Pahlevan Sharif *et al.* (2020) argue that financial literacy helps to manage financial resources effectively which, in turn, improves financial well-being, implying that the ability to manage financial resources may mediate the direct association between financial literacy and financial well-being. Research concludes a positive association between financial education and financial capability (Xiao and O'Neill, 2016), financial capability and financial satisfaction (Xiao *et al.*, 2014), and a strong mediating role of financial capability in the association between financial education and financial well-being (Xiao and Porto, 2017). In

this paper, we extend the knowledge in this field of research and posit the following hypothesis:

H1. Financial capability mediates the association between financial literacy and financial well-being.

2.2 The moderating role of NIB

Literature shows factors that may strengthen or weaken the association of financial literacy with financial capability and financial well-being (García, 2013). The locus of control (Mahdzan *et al.*, 2019), a propensity to plan (Xiao and O'Neill, 2018), attitude towards money (Utkarsh *et al.*, 2020), and savings and spending pattern (Fünfgeld and Wang, 2009; Shih and Ke, 2014) are important factors that have a strong relevance with the financial well-being of consumers. Locus of control refers to one's perceived control over personal actions (Mahdzan *et al.*, 2019), whereas a propensity to plan refers to one's propensity for future financial planning (Xiao and O'Neill, 2018). Both concepts (locus of control and a propensity to plan) are related to the concept of impulsivity as impulsive consumers perform actions without having control over their thoughts and without planning for the future. A propensity to plan is found to strengthen the positive association between financial literacy and financial well-being (Lee *et al.*, 2020). In other words, those consumers who set long-term future financial goals and have high financial literacy skills are more likely to achieve higher levels of financial well-being (Lee *et al.*, 2020). However, the literature has not considered the moderating effect of NIB on the associations of financial literacy with financial capability and financial literacy with financial well-being.

From an economic viewpoint, impulsivity can be related to the concept of the life-cycle hypothesis (LCH) (Frigerio *et al.*, 2020). The LCH argues that consumers' consumption and savings pattern may be affected by their inconsistent preferences over time (Modigliani and

Brumberg, 1954). These inconsistent preferences, short-term priorities, and impulsive tendencies of consumers not only affect their ability to manage their personal finance but also deteriorate their financial condition (Frigerio *et al.*, 2020). Impulsive consumers can be fascinated by immediate rewards, which leads to their financial harm (Fenton-O'Creevy *et al.*, 2018). Literature supports the argument that consumers with impulsive and short-term oriented tendencies compromise their financial capability and sacrifice their financial well-being (Fenton-O'Creevy *et al.*, 2018; Frigerio *et al.*, 2020).

Although financial education and financial literacy are the predictors of financial capability and financial well-being (Xiao and O'Neill, 2016; Xiao and Porto, 2017; Lee *et al.*, 2020), research contends that an impulsive and short-term oriented behavior may dominate their financial decision-making process and weaken the impact of consumers' financial knowledge on both their financial capability and financial well-being (García, 2013; Ottaviani and Vandone, 2011; Guzavicius *et al.*, 2015; Lee *et al.*, 2020). We, therefore, posit the following hypotheses:

H2. NIB moderates the association between financial literacy and financial capability.

H3. NIB moderates the association between financial literacy and financial well-being.

Following is the proposed research model of this paper:

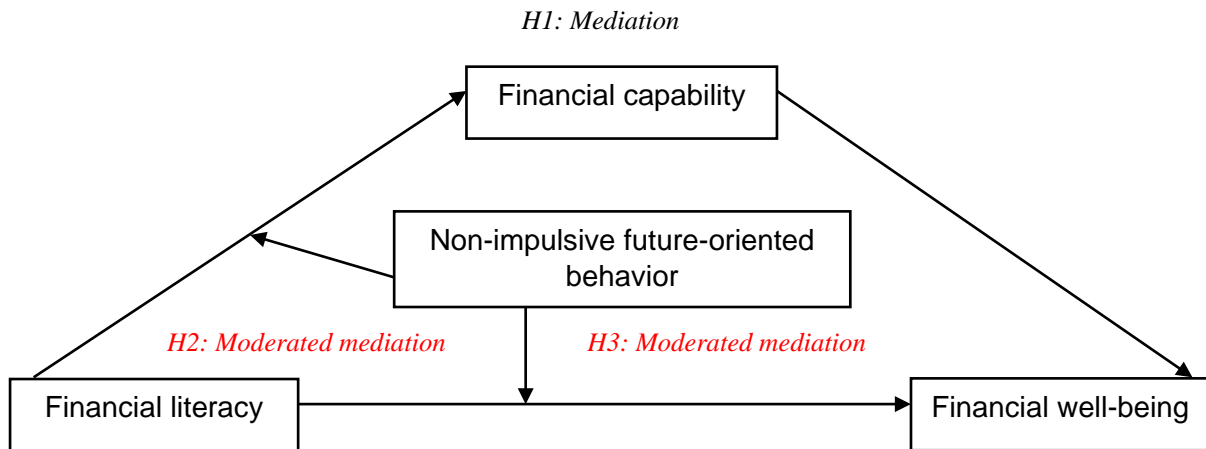


Figure 1. The research model and proposed hypotheses

3. Data, variables, and method

We use the HILDA survey, which commenced in 2001, and is a nationwide household panel study that collects information on social, demographic, and socio-economic aspects (Summerfield *et al.*, 2017). Initial details of this dataset can be read from Wooden *et al.* (2002), while Wooden and Watson (2007) documented its initial contributions to the literature. The survey is repeated in yearly waves, and wave 16 (collected in 2016) is suitable for our research because it contains the variables of financial literacy, NIB, financial capability, and financial well-being. As HILDA is a secondary dataset, it requires cleaning, filtering, and omitting missing responses before analysis.

3.1 Measuring financial literacy

The wave 16 module on financial literacy includes five objective financial literacy questions. These five questions relate to simple interest, inflation, risk and return, portfolio choice, and the time value of money. We append the questions in Table A1. These questions are similar to other studies, which analyzed financial literacy (van Rooij *et al.*, 2011; Pahlevan Sharif *et*

al., 2020). These are multiple-choice questions, which contain one correct and other incorrect choices. We combine all incorrect responses into one category. Additionally, those who answered ‘don’t know’ are treated as incorrect answers because these questions request a correct answer. This filtering process provides us with five separate binary dummy variables for each of the five financial literacy concepts. We recode correct answers as ‘1’ and incorrect answers as ‘0’ in each case.

In the next step, we combine financial literacy questions to form one variable (Xiao and O'Neill, 2016; Ali *et al.*, 2015). This transformed variable represents the levels of financial literacy. Here, ‘0’ represents that the respondents have answered incorrectly to all the five questions, while ‘5’ depicts the respondents' high financial literacy level. Overall, we term the transformed variable as ‘financial literacy’.

3.2 Measuring financial capability

We measure financial capability following the four categories of financial capability provided by Atkinson *et al.* (2007) and endorsed by Luukkanen and Uusitalo (2019). These four categories of financial capability include (1) the ability to manage money, (2) saving for future needs, (3) making informed financial decisions confidently, and (4) understanding financial products and financial commitments. We identify eight items in the 2016 wave of HILDA, measuring the concept of financial capability. We append the items in Table A2.

3.3 Measuring NIB

In the 2016 wave of HILDA, we find the following six items to measure NIB: *I do things without giving them much thought, I am impulsive, I say things before I have thought them through, I only focus on the short-term, I tend to live for today and let tomorrow take care of itself, and the future will take care of itself*. The items were measured on a seven-point Likert-

scale, '1' for *strongly disagree* and '7' for *strongly agree*. We reverse the scale ('1' for *strongly agree* and '7' for *strongly disagree*) to make these items consistent with other variables of this study.

3.4 Measuring financial well-being

We identify two items in HILDA, measuring financial well-being. Brown and Gray (2016) employ these items as measures of financial well-being. The first item relates to subjective prosperity, that is, *given your current needs and financial responsibilities, would you say that you and your family are?* There were six options available to the respondent, from *prosperous* to *very poor*. To make this item consistent with other variables of this study, we reverse the scale of this item from *very poor* to *prosperous*. The second item relates to financial satisfaction, that is, *show your satisfaction level with your current financial situation?* There were 11 options available to respondents from '0' for *totally dissatisfied* to '10' for *totally satisfied*.

3.5 Cleaning and filtering of the dataset, and participants' characteristics

Before proceeding towards the statistical analyses, the dataset needs to be cleaned and verified. Since we analyze secondary data, we need to match the variables and examine the coding sequence to clean and filter the dataset. Each variable outlined above had some missing responses, which we omit. Out of a total of 17,694 respondents, we identify that 14,958 respondents responded to all the variables of interest. The cleaned and filtered dataset comprises 52 percent females, 47 percent married, and 67 percent full-time or part-time employed respondents. The minimum age of respondents is 15, and the maximum age is 99, with a mean value of 45. The average income is 48,055 in Australian dollars. Furthermore, this dataset consists of 27 percent respondents who have earned bachelor/graduate

diploma/postgraduate degrees, while 73 percent have earned years 11 or below/year 12/certificate III or IV/advanced diploma degrees.

3.6 Standardizing the key variables

As the items of the interested variables are measured on different scales (see above sub-sections 3.1, 3.2, 3.3, and 3.4), each item needs to be standardized before combining them to form their respective variables. Literature suggests different techniques to standardize the variables (Schaffer and Green, 1996). This paper uses the z-score technique as the research in social sciences often uses this technique to standardize the variables (Kesavayuth *et al.*, 2018; Kesavayuth *et al.*, 2020).

According to Gardó and Klaus (2020, p. 823), “a z-score indicates how many standard deviations an observation is away from the mean.” The following equation calculates a z-score:

$$z = \frac{x_i - \mu}{\sigma} \quad (1)$$

where, z is the z-score, x_i is an individual's response to an item, μ is the sample mean, and σ is the sample standard deviation. A positive z-score shows a positive deviation from the mean, while a negative z-score indicates a negative deviation from the mean (Kesavayuth *et al.*, 2020).

The five items of financial literacy, six items of NIB, eight items of financial capability, and two items of financial well-being (as identified in the above sub-sections of this paper) are standardized. Using the z-score method, these individual items are set to the mean value of zero and a standard deviation of one.

In the next step, we form the variables of NIB, financial capability, and financial well-being by taking the arithmetic means of their respective items.

3.7 Data analysis

First, we show a correlation among the main variables of interest using Pearson correlation analysis. Second, since the traditional approach of mediation analysis (Baron and Kenny, 1986) has some statistical limitations regarding the lack of power (Hayes, 2009), we use the PROCESS macro for SPSS (Model 4) to examine the mediating effect of financial capability (Hayes, 2017). Third, we apply the PROCESS macro for SPSS (Model 8) to assess a combined moderated mediating effect of NIB and financial capability, respectively (Hayes, 2017). In Model 8, we specify financial literacy as an independent variable, financial well-being as a dependent variable, financial capability as a mediator variable, NIB as a moderator variable, and age, gender, and income as control factors. In both Models 4 and 8 of the PROCESS macro, we perform a non-parametric distribution-free bootstrapping technique with 5,000 resamples to obtain the 95% confidence intervals (CIs). This baseline is accepted as it addresses the concerns regarding the type 1 error (Hayes, 2017).

The next section shows the results of the data analysis using the PROCESS macro.

4. Results

This section presents a possible correlation among the variables followed by the empirical results and their interpretation. We test our proposed hypotheses after we present empirical results.

4.1 Preliminary analysis

Table I shows the descriptive statistics and correlation analysis of the key variables. In Table I, means and standard deviations are reported before standardizing the variables. Our sample shows a high financial literacy score, positive NIB, overall higher financial capability skills, and above-average levels of financial well-being. Furthermore, the correlation analysis

indicates that all the key variables have a statistically significant and positive relationship with each other.

[Table I about here]

4.2 Empirical findings, results analysis, and hypotheses testing

Table II presents the results of the PROCESS Model 4. This model uses three steps to examine the mediating role of financial capability in the association between financial literacy and financial well-being after controlling for the effects of age, gender, and income. First, it shows the total effect of financial literacy on financial well-being. Second, it regresses financial literacy on financial capability. Third, it presents the direct effect of financial literacy on financial well-being while controlling for financial capability. As Table II shows, financial literacy is statistically significant in all three steps. It implies that financial literacy has a direct and indirect positive association with financial well-being. The results indicate that the mediation effect accounts for 48%¹ of the total effect of financial literacy on financial well-being. These findings support our hypothesis H1 and imply a strong partial mediating role of financial capability in the association between financial literacy and financial well-being.

[Table II about here]

Next, Table III shows the results of the PROCESS Model 8, which assesses the moderated mediation relationships of variables after controlling for the effects of age, gender, and income. This model runs two regressions. The first regression estimates the moderating role of NIB in the association between financial literacy and financial capability, whereas the

¹ Total effect of financial literacy = 0.071

Direct effect of financial literacy = 0.037

Mediation effect = $\frac{(0.037-0.071)}{0.071} = -48\%$

second regression examines the moderating role of NIB in the association between financial literacy and financial well-being. Table III shows the results of both regressions, where the interaction between financial literacy and NIB is statistically significant and positive. It implies a positive moderating role of NIB in the associations of financial literacy with financial capability and financial literacy with financial well-being. These findings support our hypotheses H2 and H3. The further results show that at -1 standard deviation on NIB, financial literacy is not significantly associated with financial capability and financial well-being. At the mean value and +1 standard deviation on NIB, financial literacy is statistically significantly associated with both financial capability and financial well-being.

The same results are estimated in further conditional direct and indirect effect of financial literacy on financial well-being presented in Table IV. Specifically, these results indicate that, for consumers with low NIB score, the direct and indirect association between financial literacy and financial well-being is insignificant. Whereas, for consumers with high NIB score, the direct and indirect association between financial literacy and financial well-being is significant. Overall, the bias-corrected percentile bootstrap analysis in the PROCESS Model 8 presented in Table IV shows that NIB moderates the indirect effect of financial literacy on financial well-being via financial capability, $B = 0.017$, $SE = 0.004$, $95\%CI = [0.010, 0.025]$.

[Table III about here]

[Table IV about here]

In addition to these results, we plot predicted financial capability and financial well-being against financial literacy for low and high NIB scores. Figure 2 depicts the predicted financial capability scores graph, whereas Figure 3 shows the graph of the predicted financial well-being scores. As shown in both the graphs, the positive associations of financial literacy with financial capability and financial literacy with financial well-being significantly occur for those who score high on NIB. For the respondents with low levels of NIB, a statistically

significant change in financial capability and financial well-being does not occur with changes in financial literacy.

[Figure 2 about here]

[Figure 3 about here]

4.3 Robustness checks

Structural equation modeling (SEM) is another data analysis method that similar studies often adopt. However, we opt to use the PROCESS macro because the PROCESS macro has some unique features (Hayes *et al.*, 2017). The results of the PROCESS macro provide a graphical representation of the moderated effects. These graphs depict the impact of the interaction between the independent and moderator variables on the dependent variable. Another reason to use PROCESS macro is that it provides an overall moderated-mediation index which helps to validate or invalidate the research model, statistically. Despite these unique features of the PROCESS macro, we run the path analysis in the SEM to check the robustness of the main empirical results of the paper. We found that the results of the path analysis are very similar to those produced using the PROCESS macro. The SEM output of the path analysis is appended in Tables A3 and A4.

5. Discussion

Financially literate consumers are more likely to achieve higher levels of financial well-being (Limbu and Sato, 2019; Pahlevan Sharif *et al.*, 2020). However, there is a gap in the literature explaining the mediating and moderating mechanisms underlying this association. This study adds to our knowledge that there exists a mediating role of financial capability and the moderating role of NIB in the association between financial literacy and financial well-being. The following sub-sections separately discuss these findings.

5.1 The mediating role of financial capability

Given the categorization of financial capability by Atkinson *et al.* (2007) and Luukkanen and Uusitalo (2019), our study is the first to distinctly examine the mediating role of financial capability in the association between financial literacy and financial well-being. Previously, Xiao and Porto (2017) analyzed the mediating role of financial capability in the association between financial education and financial satisfaction (an indicator of financial well-being). Xiao and Porto (2017) define financial capability as a combination of financial literacy, four desirable financial behaviors (spending attitude, savings attitude, regularly examining credit reports, and retirement planning), and an attitude towards monitoring financial matters. Overall, Xiao and Porto (2017) incorporate financial literacy within the broader concept of financial capability. However, given the definitions of financial literacy (the knowledge of basic financial concepts (Lusardi and Mitchell, 2011)) and financial capability (the ability of consumers to apply their prior financial knowledge and to conduct financial tasks (Curley *et al.*, 2013; Sherraden, 2013)), we keep these two concepts distinct and examine if the ability of consumers to conduct financial tasks plays an intervening role in meeting the objective of financial literacy to achieve higher levels of financial well-being.

The four categories of financial capability by Atkinson *et al.* (2007) and Luukkanen and Uusitalo (2019) also reinforce the idea that the financial capability concept is distinct from the financial literacy concept. A recent bibliometric-analysis by Goyal and Kumar (2021) shows that financial capability and financial well-being are financial literacy outcomes. Therefore, we conducted an analysis, which revealed that financial literacy is positively associated with financial capability and financial well-being. Specifically, our mediation analysis indicated that consumers' financial knowledge is related to their ability to perform financial tasks efficiently, and this, in turn, is associated with higher levels of their financial

well-being. Therefore, financial capability is not only an outcome of financial literacy but also a determinant of financial well-being. Moreover, it is worth noting that financial capability plays a strong yet partial mediating role in the association between financial literacy and financial well-being. The remaining positive and direct association between financial literacy and financial well-being suggests that financial well-being is also a function of the direct effects of financial literacy.

Our results are in line with the prior literature which shows a positive association of financial literacy with an ability to save (Jappelli and Padula, 2013), an ability to budget and control spending (Perry and Morris, 2005), an ability to maintain emergency funds and interact with financial products (Kim *et al.*, 2019), and an ability to make informed financial decisions (Sivaramakrishnan *et al.*, 2017). In our study, we combined all these factors under the umbrella of financial capability. We found that financial literacy positively improves a consumer's ability to save and manage money, interacting with financial institutions and financial products efficiently, and making informed financial decisions. Such an improvement in the ability of consumers to manage their finances, in turn, improves their financial condition and enhances their levels of financial satisfaction (Lee *et al.*, 2020; Xiao *et al.*, 2014). These findings also support the life-cycle model developed by Lusardi and Mitchell (2014), which suggests that a financially literate person, as compared to the others, performs better in financial terms.

5.2 The moderating role of NIB

The critical analysis of the relevant literature highlighted that impulsive behavior and lack of financial planning adversely affect consumers' financial decisions (Frigerio *et al.*, 2020; Ottaviani and Vandone, 2011), deteriorating their financial condition. Literature has not yet considered if NIB strengthens financial literacy association with financial capability and

financial well-being. Given the recommendation for future researchers by Riitsalu and Murakas (2019) and Goyal and Kumar (2021), our study is the first to analyze the moderating role of NIB in the associations of financial literacy with financial capability and financial literacy with financial well-being. Our results conveyed that NIB is highly positively associated with financial capability and financial well-being. These results are in line with the prior literature, showing a positive association of a propensity to plan with financial capability, financial satisfaction, and financial well-being (Xiao and O'Neill, 2018; Lee *et al.*, 2020).

Furthermore, our findings indicated that the interaction between financial literacy and NIB has a significant positive association with financial capability and financial well-being. Our results showed that the model's explanatory power significantly increased when the interaction term was included in the model. This is a significant contribution to the literature as we highlight that consumers with a combination of high financial literacy skills and positive NIB are more likely to perform their financial tasks better, perceive that their financial condition is relatively better, and they are financially satisfied. Hence, improving consumers' financial literacy skills and their financial planning skills are pertinent to improve the quality of their financial decisions, enhancing the level of their financial satisfaction. Our further results revealed that the associations between financial literacy and financial capability and financial literacy and financial well-being were significant for those consumers who scored high on NIB. Whereas, the associations of financial literacy with financial capability and financial literacy with financial well-being were insignificant for those consumers who scored low on NIB. These findings suggest that consumers' impulsive behavior and short-term orientation may restrict the application of financial knowledge in performing financial tasks, affecting their overall financial well-being. The findings align with the psychological bias of 'hyperbolic discounting', suggesting that impulsive and short-

term oriented consumers are more likely to make sub-optimal financial decisions (Frigerio *et al.*, 2020). Our results also support the application of the LCH by revealing that the consumers' time-inconsistent and sub-optimal preferences impact their savings and consumption pattern (Modigliani and Brumberg, 1954), affecting their financial condition. We further explain the practical implications in the next section.

6. Conclusion and implications

Consumer financial well-being is an important predictor of overall consumer well-being (Netemeyer *et al.*, 2018). The question – how can the financial well-being of consumers be improved? – is of significant value. Our study is the first to examine and conclude the moderating role of NIB and the mediating role of financial capability in the association between financial literacy and financial well-being. Our findings highlight the importance of improving both financial literacy and financial planning skills of consumers to enhance their levels of financial well-being. However, this holds when consumers are non-impulsive and future-oriented.

The results of this study have a number of implications for professional financial advisors, financial institutions and their managers, academics, and policy-makers. As our unique contribution highlighted that the interaction between high financial literacy and positive NIB has a statistically significant positive association with financial well-being, curricula that teach financial literacy skills should pay attention to the impulsive tendencies of consumers. If consumers have impulsive tendencies and an orientation towards the present over the future, improving their financial literacy is an ineffective tool to change financial behavior. Thus, different mechanisms, such as awareness of impulsivity and the introduction of self-control mechanisms, may be more beneficial ways to raise financial decision-making. Furthermore, as the consumer-related policies of financial institutions directly affect the well-

being of consumers, the government should monitor such policies and introduce some necessary interventions where needed.

We also suggest introducing programmes discouraging impulsive behavior. These programmes should teach people that they should think about the possible consequences before performing an action. Such programmes should also include workshops that teach people how to set-up long-term future financial goals and track them regularly. Educational institutions can play a vital role in implementing such strategies with the collaboration of financial institutions.

Professional financial planners and advisors can enhance the ability of consumers to manage their finance efficiently by encouraging them to create financial plans. Often financial planners ascertain a client's financial literacy when assessing the client's tolerance of risk. However, financial planners could also assess the client's ability to undertake financial tasks because our research shows that financial capability is a significant facet of financial well-being.

From a managerial viewpoint, this research offers implications for institutions and practitioners interested in raising the levels of consumer financial well-being. Until now, financial literacy has been perceived as a common skill to improve financial well-being (Limbu and Sato, 2019; Pahlevan Sharif *et al.*, 2020; Remund, 2010). However, given the outcome of this research that a combination of high financial literacy skills and a positive NIB increases the likelihood of achieving higher levels of financial well-being, institutions can spread awareness to discourage impulsive behavior and encourage future-orientation. For this purpose, this research recommends managers to arrange training sessions for their employees. These training sessions should focus on teaching employees financial literacy skills and promoting the habits of non-impulsive, long-term, and future-oriented financial decisions. These training sessions would have a twofold benefit. First, a knowledgeable and

trained employee would showcase these habits in his/her personal and professional life.

Second, if this is an institution dealing with financial products, these trained employees would teach their customers specific protocols to counter impulsive behavior (such as consumer's self-imposed consumption constraints) and help them develop an ability to conduct financial tasks (such as draw up a budget).

Finally, credit cards often trigger impulsive behavior with an attraction of the buy now pay later (BNPL) option (Frigerio *et al.*, 2020). More recent financial technology innovation, such as Afterpay, focuses specifically on this BNPL premise. Yet, extant research shows that credit card debt is a relatively more stressful and problematic type of debt than the others (Dunn and Mirzaie, 2012; 2016). Given the negative implications of credit card debt and a source of impulsive behavior, some interventions should be introduced by discouraging credit cards and regulating the related policies of financial institutions. The financial services industry may intervene in this matter in the best interest of consumers.

7. Limitations and future research

Although we make unique contributions to the literature of personal finance, our study has some limitations. As we analyzed a cross-sectional dataset, we can only interpret an association between the variables instead of a causal link. We encourage future researchers to conduct a longitudinal or experimental analysis to explore if there exists a causal effect of financial literacy and NIB on consumer financial well-being. Further, we measured financial literacy objectively. A different result may appear if financial literacy is measured subjectively.

Moreover, other factors that we could not incorporate in our study may disturb consumers' financial condition. Risk-taking attitude could be a determinant of current financial condition. Future-researchers may include risk-taking attitude and analyze its effect on financial well-

being and consumer financial decisions. As we employed a secondary dataset, we could only use two items to measure subjective financial well-being. Adding more measures could generate different results. Financial well-being may be affected by a person's social status. A further analysis exploring the association of one's social status and financial well-being will be a valuable addition to the personal finance literature. Finally, comparing different age groups, such as young and old, or employment status, such as employed vs retired, would provide meaningful implications for policy-makers.

8. References

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Table I. Means, standard deviations, and Pearson correlation analysis of key variables

Variable	<i>M</i>	<i>SD</i>	1	2	3
1. Financial literacy	4.047	1.153			
2. NIB	4.822	1.140	0.195***		
3. Financial capability	5.082	1.248	0.142***	0.323***	
4. Financial well-being	5.253	1.321	0.105***	0.188***	0.379***

Notes: *** p<0.001 ** p<0.01 * p<0.05. N=14,958. Means (M) and standard deviations (SD) are reported before standardizing the variables.

Table II. Result of the PROCESS Model 4 (mediation analysis)

Variable	Financial well-being			Financial capability			Financial well-being		
	Coefficient	LB	UP	Coefficient	LB	UP	Coefficient	LB	UB
Age	0.043*** (0.000)	0.001	0.003	0.282*** (0.000)	0.011	0.013	-0.058*** (0.000)	-0.004	-0.002
Female	0.030*** (0.015)	0.024	0.081	0.035*** (0.013)	0.031	0.080	0.017* (0.014)	0.003	0.057
Income	0.174*** (0.000)	-	-	0.060*** (0.000)	-	-	0.153*** (0.000)	-	-
Financial literacy	0.071*** (0.008)	0.048	0.078	0.095*** (0.007)	0.062	0.089	0.037*** (0.007)	0.018	0.047
Financial capability							0.359*** (0.010)	0.382	0.420
N	14,958			14,958			14,958		
R-squared	0.043			0.105			0.158		
F-statistics	102.448***			430.909***			451.555***		

Mediation effect

-48%

Notes: *** $p < 0.001$ ** $p < 0.01$ * $p < 0.05$. Coefficients are standardized. Robust standard errors in parentheses. LB denotes lower bound. UB denotes upper bound.

Table III. Results of the PROCESS Model 8 (moderated mediation analysis)

Variable	Financial capability			Financial well-being		
	Coefficient	LB	UP	Coefficient	LB	UB
Age	0.011*** (0.000)	0.011	0.012	-0.003*** (0.000)	-0.003	-0.002
Female	0.022 (0.012)	-0.001	0.046	0.024 (0.014)	-0.003	0.050
Income	0.000*** (0.000)	-	-	0.000*** (0.000)	-	-
Financial literacy (FL)	0.040*** (0.007)	0.026	0.053	0.028*** (0.008)	0.013	0.043
NIB	0.343*** (0.010)	0.324	0.362	0.084*** (0.011)	0.063	0.106
FL × NIB	0.046*** (0.010)	0.026	0.066	0.025* (0.010)	0.005	0.045
Financial capability				0.378***	0.358	0.398

				(0.010)		
At -1 standard deviation on NIB	0.008	-0.009	0.026	0.011	-0.007	0.029
	(0.009)			(0.009)		
At the mean of NIB	0.040***	0.026	0.053	0.028***	0.013	0.043
	(0.007)			(0.008)		
At +1 standard deviation on NIB	0.071***	0.051	0.091	0.045***	0.023	0.067
	(0.013)			(0.011)		
N	14,958			14,958		
R-squared	0.187			0.162		
F-statistics	551.229***			347.934***		

Notes: ***p<0.001 **p<0.01 *p<0.05. Coefficients are unstandardized. Robust standard errors in parentheses. LB denotes lower bound. UB denotes upper bound.

Table IV. Conditional effects of financial literacy on financial well-being (PROCESS Model 8)

	Financial well-being		
	Coefficient	LB	UB
<i>Conditional direct effect of financial literacy on financial well-being</i>			
At -1 standard deviation on NIB	0.011 (0.009)	-0.007	0.029
At the mean on NIB	0.028 (0.008)	0.013	0.043
At +1 standard deviation on NIB	0.045 (0.011)	0.023	0.067
<i>Conditional indirect effect of financial literacy on financial well-being</i>			
At -1 standard deviation on NIB	0.003 (0.003)	-0.004	0.010
At the mean of NIB	0.015 (0.015)	0.010	0.020
At +1 standard deviation on NIB	0.027	0.019	0.035

	(0.027)		
Overall index of moderated mediation	0.017	0.010	0.025
	(0.004)		

Notes: Robust standard errors in parentheses. LB denotes lower bound. UB denotes upper bound. If there comes zero (0) between the values of LB and UB, it implies that the coefficient is insignificant. If zero (0) does not come between the values of LB and UB, the coefficient is significant.

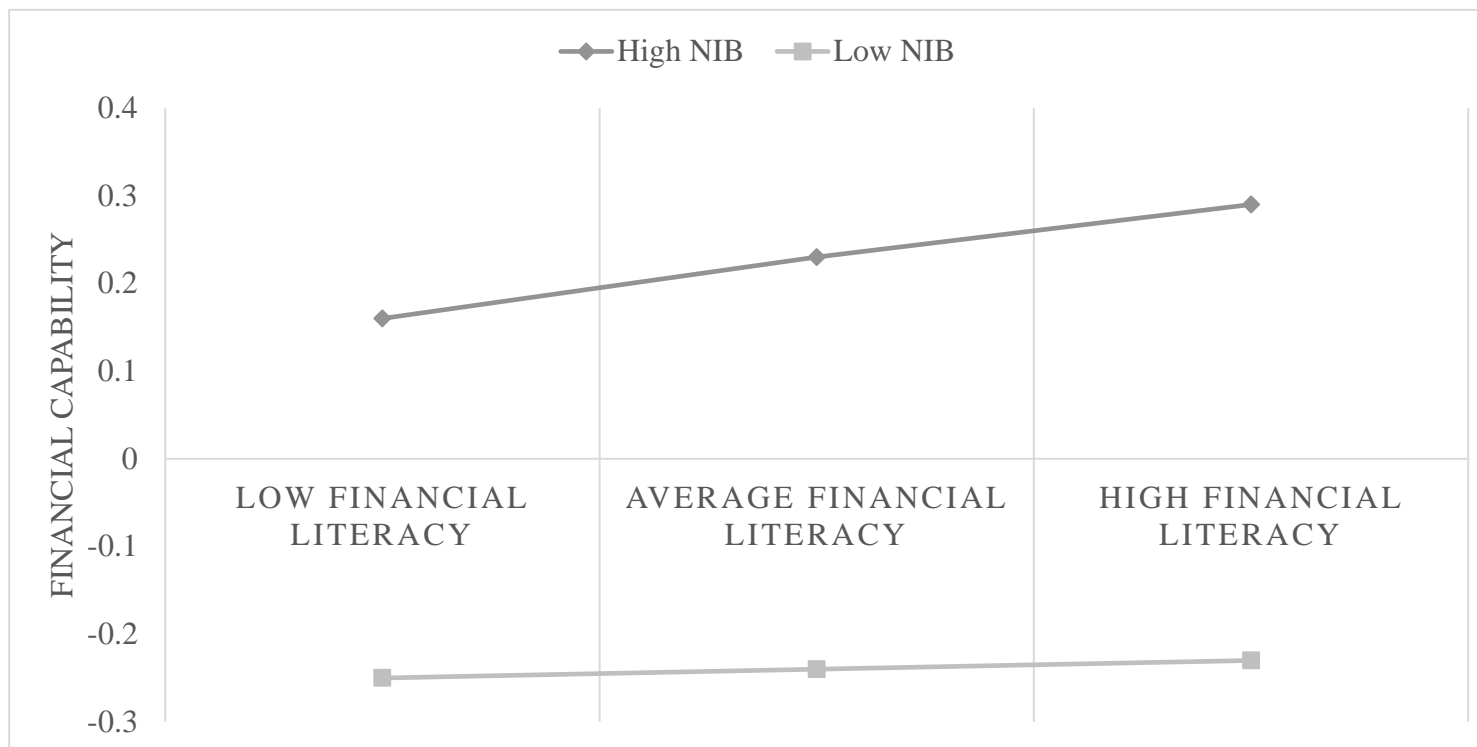


Figure 2. Plot of interaction between financial literacy and NIB on financial capability

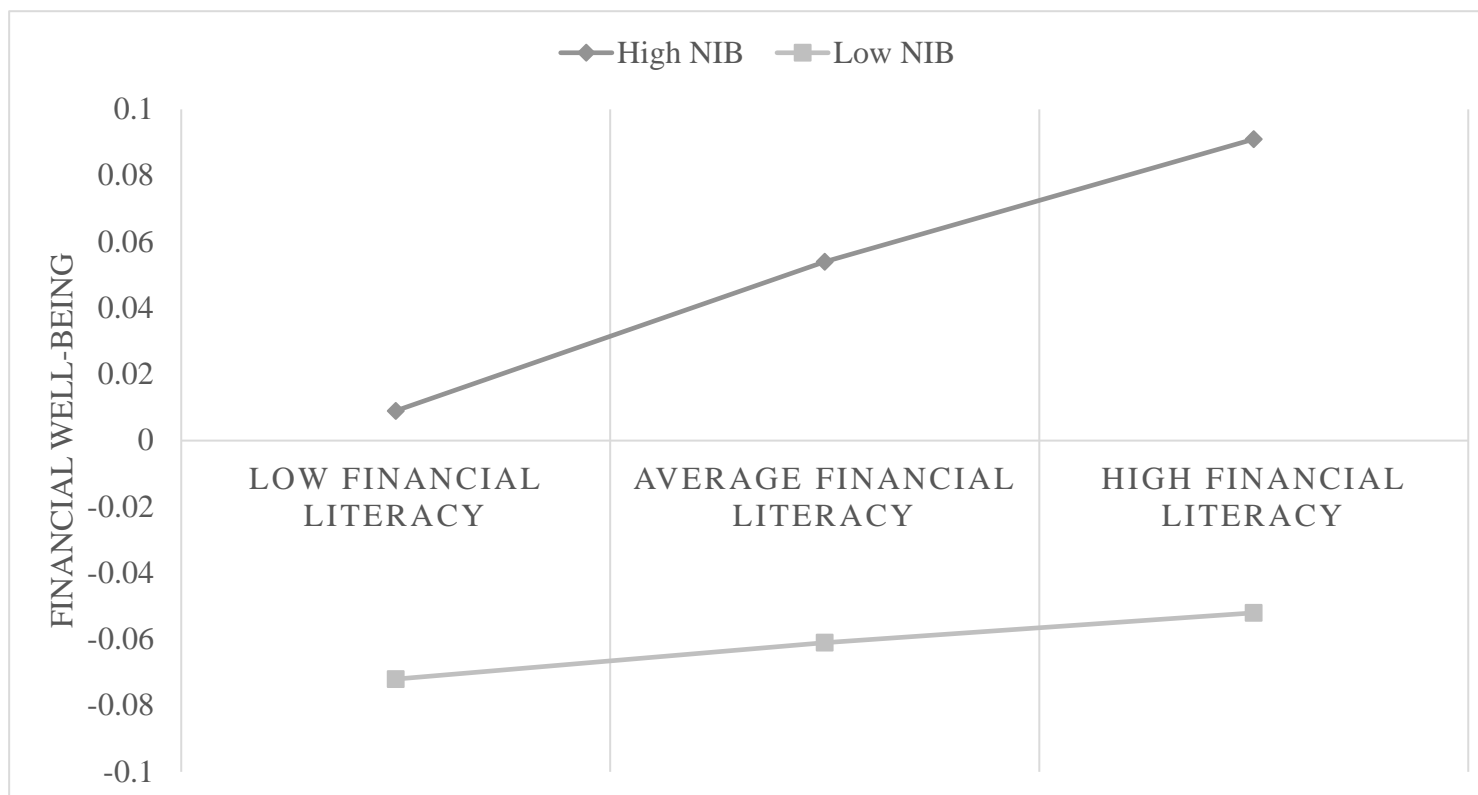


Figure 3. Plot of interaction between financial literacy and NIB on financial well-being

9. Appendices

A1. Five concepts measuring financial literacy in the 2016 wave of HILDA

Financial literacy concept	Items	Possible responses (correct answer in bold)
Simple interest	“Suppose you put \$100 into a no-fee savings account with a guaranteed interest rate of 2% per year. How much would be in the account at the end of the first year?”	Don’t know / refused / \$102 / other value
Inflation	“If the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, would you be able to buy more/the same/less than today?”	Don’t know / refused / more / same / less than today
Risk and return	“An investment with a high return is likely to be high risk.”	Don’t know / refused / true / false
Portfolio choice	“Buying shares in a single company usually provides a safer return than buying shares in a number of different companies.”	Don’t know / refused / true / false
Time value of money	“If by the year 2020 your income has doubled, but the prices of all of purchases have also doubled. In 2020, will you be able to buy more/the same/less than today?”	Don’t know / refused / more / same / less than today

Note: Each financial literacy question has a correct and incorrect answer(s). A financial literacy measure is developed by taking the sum of correct answers provided by each individual.

A2. Items measuring financial capability

Items

1. I am very organized when it comes to managing my money daily
2. I keep a close personal watch on my financial affairs
3. I always make sure I have money saved up for emergency/unexpected expense
4. I do a good job of balancing my spending and saving
5. I am good at dealing with day-to-day financial matters
6. I feel confident about the financial decision I make
7. I make certain I understand the commitments I agree to in financial contracts
8. I feel comfortable dealing with banks and other financial institutions

Note: These items were measured on a seven-point Likert-scale (1 for strongly disagree - - - - 7 for strongly agree).

A3. Mediation analysis using SEM in Amos (path analysis)

Variable	Financial well-being	Financial capability	Financial well-being
Financial literacy	0.094*** (0.014)	0.130*** (0.013)	0.037*** (0.014)
Financial capability			0.441*** (0.010)
N	14,958	14,958	14,958
Mediation effect			-61%

Notes: ***p<0.001 **p<0.01 *p<0.05. Coefficients are standardized. Robust standard errors in parentheses. The mediation analysis controls for age, gender, and income.

A4. Moderated-mediation analysis using SEM in Amos (path analysis)

Variable	Financial capability	Financial well-being
Financial literacy (FL)	0.046*** (0.014)	0.029* (0.015)
NIB	0.345*** (0.011)	0.069*** (0.011)
FL × NIB	0.058*** (0.010)	0.021* (0.010)
Financial capability		0.417*** (0.011)
N	14,958	14,958

Notes: ***p<0.001 **p<0.01 *p<0.05. Coefficients are standardized. Robust standard errors in parentheses. The moderated-mediation analysis controls for age, gender, and income.