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The psychological antecedents of personal financial management behaviour: A meta-analysis

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The psychological antecedents of personal financial management behavior: A meta-analysis

Abstract

Purpose-The intent of this study is to aggregate, in a measurable form, the results of previous studies on the association between personal financial management behavior (PFMB) and six psychological factors, which are financial attitude, financial self-efficacy, self-control, materialism, internal locus of control, and external locus of control.

Design/methodology/approach- A stack of 32 research documents that investigated 52 relationships between various psychological variables and PFMB was analysed using the meta-analysis technique. Along with the overall meta-analysis, a comprehensive subgroup analysis was also undertaken counselled to determine whether the results contrast on account of the age group of the sample and the economy of the country to which the sample belongs.

Findings- The overall meta-analysis findings do not support the association between PFMB and the various explanatory variables except for the significant positive association with self-control. In contrast, a subgroup study revealed that self-control (positively) and materialism (negatively) were found to be significantly associated with PFMB among adults. The association between internal Locus of Control (LOC) and PFMB is significant and positive among the young. Interestingly, self-control appeared to be significantly and positively associated with PFMB in developed countries. In developing countries, financial attitude, financial self-efficacy, and internal LOC are significantly and positively associated with PFMB.

Originality/value- Distinct from other review papers, this meta-analysis quantitatively cumulates and reconciles the conflicting findings on the linkage between psychological predictors and PFMB. To the best of the authors' knowledge, this is the first meta-analysis on the topic.

Keywords Meta-analysis, Personal financial management behavior, Financial behavior, Financial planning, Psychology

Paper type: Research paper

1. Introduction

Lately, the management of personal finances of individuals has gained paramount importance due to the complexities in financial choices, liberal credit policies, and the onus of planning one's own social security (Xu and Zia, 2012; Estelami, 2014). Robust financial management practices would help individuals achieve sound financial health (Hilgert *et al.*, 2003; Schuchardt *et al.*, 2007). “*Personal Financial Management Behavior (PFMB) is a process which assimilates all components of individuals’ financial interest. These include cash flow management, investments, risk management, retirement planning, tax planning, and estate planning*” (Altfest, 2004, p. 54).

Desirable financial behavior should improve consumer financial wellbeing, while undesirable financial behaviors hurt economic wellbeing. Although lack of financial literacy is predominantly contemplated to be the cause of unsuccessful financial behavior (Lusardi and Mitchell, 2007; Lusardi *et al.*, 2020; Goyal and Kumar, 2021), it may not necessarily be its sole determinant (Huston, 2010; Copur and Gutter, 2019; Amagir *et al.* 2020). Furthermore, the variation in demographics and personal income offer almost negligible reasons to explain disparities in managing personal finances (Allgood and Walstad, 2013).

The nature of personal finance is multidisciplinary, having presence in psychology, sociology, finance, and economics (Schuchardt *et al.*, 2007). Several disciplines have approached the study of financial behaviors through their respective theoretical lenses (Copur and Gutter, 2019). Professionals, educators, and policymakers primarily aim to develop programs that focus on providing financial knowledge to individuals who are expected to be involved in rational financial decision-making. Notwithstanding, in reality, many psychological attributes influence one's personal financial behavior (Hilgert *et al.*, 2003; Perry and Morris, 2005; Grable *et al.*, 2009; McNair *et al.*, 2016). Thus, it is crucial to understand the behavioral biases that go against the standard economic theory, moving individuals from

rational agents (those who make rational decision-making) to behavioral agents (those whose decisions are affected by behavioral biases) (Schuchardt *et al.*, 2007).

PFMB is undoubtedly one of the most prolific areas of research in behavioral **finance**, yet Copur and Gutter (2019) and Bapat (2020) state that not much is known about the determinants of PFMB. Previous evidence sheds light on many psychological antecedents of PFMB and their relationship with it, but the empirical evidence is somewhat mixed (Goyal *et al.*, 2021). Such incongruities in the results make our understanding of the influence of various psychological determinants on PFMB blurry. Yet, while these determinants may indeed explain selection into desirable financial behaviors and choices, they are unlikely to be all influencing PFMB. Moreover, it is difficult to identify empirically whether such antecedents are the only determinants of PFMB.

A large number of primary studies have addressed the diverse factors related to PFMB (Perry and Morris, 2005; Grable *et al.*, 2009; Nye and Hillyard, 2013; Miotto and Parente, 2015; McNair *et al.*, 2016; Amagir *et al.*, 2018; Arofah *et al.*, 2018; Asandimitra and Kautsar, 2019; Helm *et al.*, 2019; Barbić *et al.*, 2019; Zulfaris *et al.*, 2020). Notwithstanding the preponderance of studies on the determinants of PFMB, there are still some issues which constitute entry points for revisiting the conflicting results of these studies. In the literature, there is conflicting empirical evidence on association of various psychological factors and PFMB due to factors including size of the sample, proxy measures for variables under study, different methodological approaches (Hedges and Olkin, 1985), age-group of the sample and economic development of the country from which the sample is drawn. Due to these contradictory findings, it is very difficult to generalize the relationship between psychological antecedents and PFMB. An intriguing but unexplored nuance in the PFMB literature regards what the relative magnitudes of distinctive psychological determinants are and how they are related with PFMB . While extant studies offer an in-depth examination of a specific

psychological antecedent, as a whole they are inconclusive and constitute barriers that avoid the possibility of reaching a more definitive conclusion about the role of specific psychological characteristics and behavioral biases in PFMB.

Therefore, we sensed that it was fundamentally desirable to conduct a meta-analysis so that the findings of previous studies can be consolidated and reconciled by quantitatively aggregating the effects of such determinants on PFMB. It involves pooling of data from different studies to test for significance in the enlarged sample of observations it creates. The meta-analysis technique is preferable over descriptive and narrative reviews to draw coherent conclusions, synthesize empirical results, and establish relationships across studies (Wolf, 1986, Rosenthal, 1995). The authors of a typical qualitative literature review may use a convenience selection of studies, and the rules for inclusion and treatment are sometimes unclear. There is a lot of leeway for interpretation, and shortcomings in studies are typically overlooked (Fernandes *et al.*, 2014). Meta-analysis, on the other hand, makes the guidelines for study inclusion and exclusion, as well as the coding processes for characterising similarities and differences between research, explicit. In addition, meta-analysis looks at the same independent variable-dependent variable relationships. An effect size that varies continually is the key statistic used to describe the findings.

To date, there is a paucity of studies reviewing the literature on PFMB and, more specifically, through the meta-analysis approach, despite its extensive use in the social sciences (Goyal *et al.*, 2021). Defensibly, this meta-analysis technique can make a sizable contribution to the accession of knowledge on the significant psychological influencers of one's financial decision-making. Prior literature exists on a few meta-analyses of financial literacy. Miller *et al.* (2015) and Kaiser and Menkhoff (2017) used meta-analysis to throw light on the impact of financial education interventions on financial literacy and financial behavior. The same technique has been used by Santini *et al.* (2019) to identify the antecedents and

consequences of financial literacy. Similarly, Fernandes *et al.* (2014) aggregated the effect of financial education interventions on financial behavior through meta-analysis. We failed to see a meta-analysis accumulating the effect of psychological elements on PFMB. The profession of personal finance is interdisciplinary, and professionals must have adequate knowledge of its scholarship from the psychological lens (Schuchardt *et al.* 2007) because behavioral biases overshadow any other aspect in an individual's decision making (Sadi *et al.* 2011). This careful analysis also allows the policymakers, financial counsellors and practitioners classify interventions among key psychological characteristics, thus yielding more nuanced results in terms of the desirable PFMB. Investigating the details of the influence of various psychological determinants on PFMB in this way additionally allows us to present important stylized facts about financial literacy programs, financial coaching, and other psychological interventions.

Pursuing this rationale, the present study aims to identify the overall degree of association of six major psychological factors on PFMB. This study can be considered an extension of Goyal *et al.*'s (2021) work which synthesized the antecedents and consequences of PFMB with the help of a systematic literature review. In addition, the present meta-analysis study attempts to highlight the impact of age-group differences and country's economy-wise differences in the study sample in the sub-group analysis. There is a difference between financial behavior and the psychological dispositions of the young group of the population (Helm *et al.*, 2019; Bapat, 2020; Lučić *et al.*, 2021). Similarly, differences are also found in the way people behave in their financial matters according to the economy in which they live, due to the cultural differences and the psychological interpretations (Weber and Hsee, 1998; Sachitra *et al.*, 2019; Lai and Tan, 2009). The effect of behavioral factors and practical experience on financial management behavior leads financial education to shift emphasis from financial literacy to financial capability (Kempson *et al.*, 2004; Kebede and Kuar, 2015). Many researchers consider financial literacy a cognitive, attitudinal, and behavioural factor (Copur

and Gutter, 2019; Tomar et al., 2021), however we did not. Financial literacy is mainly driven by cognitive abilities of an individual, and numerical abilities in particular (Christelis *et al.*, 2010). It could be intrinsically linked with some cognitive characteristics related with intelligence or abstract thought. Some economists and sociologists argue that non-cognitive attributes, which are different from cognitive characteristics, can also influence financial behaviour (Ameriks *et al.*, 2003; Roa *et al.*, 2019). So, our focus in this study is only on the non-cognitive factors.

In this paper, we used the meta-analysis technique developed by Hunter *et al.* (1982) to evaluate a sample of 32 studies comprising 52 relationships between PFMB and six explanatory psychological variables: financial attitude, financial self-efficacy, internal LOC and external LOC, materialism, and self-control. This general meta-analysis does not support the association between PFMB and the various explanatory variables except for self-control. The empirical findings show a significant positive association between self-control and PFMB. In contrast, a subgroup study revealed that self-control (positively) and materialism (negatively) were found to be significantly associated with PFMB among adults. In contrast, the association between internal Locus of Control (LOC) and PFMB is significant and positive among the young. Interestingly, self-control appeared to be significantly and positively associated with PFMB in developed countries. In developing countries, financial attitude, financial self-efficacy, and internal LOC are significantly and positively associated with PFMB. This study was done with the goal of merging the findings of previous PFMB studies in order to arrive at a more uniform understanding of its psychological antecedents. The findings reveal a new way of thinking about the relationship between a number of psychological factors and PFMB. If it can be discovered which traits actually influence an individual's financial behavior, as well as the amount to which those variables influence money-related prosperity, meaningful treatments to improve customers' financial behavior can

be designed. Attitudes and beliefs of the individuals about money which they make through age and background may have a significant impact on their daily financial behaviors like purchasing, spending etc. This study will help all the stakeholders understand the intricacies involved in making financial decisions.

The remainder of this paper is structured as follows: Section 2 elucidates the theoretical background on the relationship between PFMB and various explanatory variables. Section 3 describes the meta-analysis methodology and the sample characteristics. Section 4 discusses the empirical results. Finally, Section 5 concludes the study.

2. Theoretical background

Dew and Xiao (2011) consider PFMB to be a combination of consumption, cash flow management, savings and investment, credit management, and insurance. The income organisation or money management strategy among couples is conceptualised as PFMB in couples' or family finances. As a financial management behavior scale, several researchers measured PFMB by incorporating various components. Consumption, asset management, wealth accumulation, mortgage repayment, tax planning, estate planning, fintech, and charitable giving are all emerging components that have been identified in the literature (Goyal *et al.*, 2021). Thus, there are too many conceptualizations of PFMB and it is generally regarded as a multi-dimensional construct (Dew and Xiao, 2011). For conceptual and operational definitions of PFMB, refer Goyal *et al.* (2021). Financial behavior refers to human behaviors relevant to money management (Xiao, 2008). Common financial behaviors include behaviors related to earning, spending, borrowing, saving, and protecting (Xiao, 2016).

In the literature, researchers have used different names for PFMB such as best practice financial behavior, optimal financial behavior, desirable financial behavior, rational financial behavior, sound financial behavior, good financial behavior, responsible financial consumption

behavior, money management, proactive financial behavior, etc. (Robb and Woodyard, 2011; Barbić *et al.* 2019). For the rest of the paper, financial behaviors will be used as a generic term, and for the purpose of this meta-analysis, the term personal financial management behavior (PFMB) will be used as a combined measure of all types of financial behaviors.

Previous literature suggests that multitudinous psychological factors influence PFMB. The most prominent psychological factors that have been investigated in the extant literature in the context of PFMB are financial attitude, financial self-efficacy, internal LOC, external LOC, materialism, and self-control. Apart from these, other psychological factors (see Table I) are less explored in the literature. These factors primarily include coping styles such as acceptance or active coping, decision-making styles such as analytical or intuitive decision making, personality traits (extraversion, neuroticism, agreeableness, openness to experience, and conscientiousness), emotional intelligence, time orientation, and procrastination, among others.

(Insert Table I about here)

2.1 Financial attitude

Financial attitude is a psychological tendency that is expressed when evaluating financial behavior (Arifin, 2018). It is defined as a state of mind, opinion, and judgment about finance (Pankow, 2012). The most closely related and sometimes synonymously used psychological attribute to the financial attitude is money (Norvilitis *et al.*, 2006; Sundarasan and Rahman, 2017). Attitude towards money is defined as an individual's predisposition towards being financially prepared for the future, reflecting the tendency to save money and manage expenses. Based on social learning theory, an individual's behavioral actions are influenced by inner events, environment, and perception (Bandura, 1986). The perceptions and actions are the financial attitudes and PFMB, respectively. Existing research has explored the connection

between financial attitudes and good PFMB (Kidwell *et al.*, 2003; Kidwell and Turrisi, 2004; Lee *et al.*, 2019; Bapat, 2020). Young adults with a positive attitude towards money have desirable expected PFMB (Norvilitis, 2014). Mien and Thao (2015) found a positive influence of financial attitude toward PFMB. Similarly, McNair *et al.* (2016) found a significant association between financial attitude and PFMB. In contrast, Asandimitra and Kautsar's (2019) research argues that the financial attitude has no impact on PFMB.

2.2 Financial self-efficacy

Self-efficacy is the belief that people have about their capabilities to produce levels of performance (Bandura, 1994). While self-efficacy does reflect ability, it also impacts motivation as those with lower levels are more likely to quit or reduce their effort when encountering challenges or obstacles. This can create a self-fulfilling prophecy because failure to try creates failure itself. Self-efficacy theory relates to human behavior in general and financial self-efficacy pertains to financial behavior in particular. Hence, individuals who doubt their capability to handle finances are more likely to reduce effort, making them more susceptible to unhealthy financial behaviors like impulse purchases (Gamst-Klaussen *et al.*, 2019). Bandura (1986) claims that knowledge, skill, and past accomplishments are poor predictors of future attainment in the absence of self-efficacy. If confidence in one's ability is needed to undertake challenging tasks, self-efficacy may be a psychological trait that enables ambition (Chatterjee *et al.*, 2011). In PFMB, studies have found that an individual's confidence in managing his or her finance is a key factor for driving change in his or her financial behavior (Nyugen, 2019). Lown (2011) developed and tested a six-item financial self-efficacy scale for researchers, educators, counsellors, and advisors. Most of the studies have used this scale to test the hypothesis on the relationship between financial self-efficacy and PFMB.

Despite the relation between this personality trait and financial status, little is known about how financial self-efficacy impacts PFMB. One study finds that self-efficacy is indeed a

predictor of investment in financial assets and wealth creation across time (Chatterjee *et al.*, 2011). Another interesting finding is that financial self-efficacy mediates the relationship between procrastination and negative PFMB (Gamst-Klaussen *et al.*, 2019). Few studies have examined the impact of financial self-efficacy on PFMB (Herawati *et al.*, 2018; Ismail *et al.*, 2017). Asandimitra and Kautsar (2019) found a positive association between financial self-efficacy and PFMB. However, Amagir *et al.* (2018) showed no relation between the two variables.

2.3 LOC

The LOC construct is defined as a general, relatively stable propensity to see the world in a particular way, capturing general beliefs about the causes of rewards and punishments (Rotter, 1966). In order to fully appreciate the potential role of LOC in shaping behavioral outcomes, both directly and indirectly, it is helpful to understand the theoretical underpinnings of the LOC construct. According to Phares (1976), the concept of LOC emerged from tests of Social Learning Theory. LOC is typically measured on a continuum, with two extremes. On one end is an internal LOC perspective. External LOC falls on the other end of the continuum. Some studies have examined the relationship between internal LOC and PFMB, while others have focused on external LOC and PFMB. In the literature, internal LOC has been found to be positively related to PFMB (Bapat, 2020), while external LOC was found to be negatively associated with PFMB (Perry and Morris, 2005). LOC appears to significantly impact PFMB directly and indirectly, although this impact is negligible in most cases (Perry and Morris, 2005).

2.3.1 Internal LOC

Those with internal LOC associate life outcomes with their own skills, abilities, and actions. They assume that outcomes are predictably based on personal efforts, skills, and motivations.

In other words, those with an internal LOC perspective are apt to be goal-driven, and more often than not, they exhibit responsible financial decision-making skills (Grable *et al.*, 2015). Mutlu and Özer (2021) showed a positive association between internal LOC and PFMB, whereas Wahyudi *et al.* (2020) found no significant relationship between internal LOC and PFMB.

2.3.2 External LOC

Those who believe that financial outcomes are due to chance or powerful others, i.e., externals, will be slightly less likely to take steps to manage their finances (Zimmerman, 1995). A study reveals that external LOC seems to mediate the relationship between financial knowledge and PFMB, but no direct effects were found (Grable *et al.*, 2009). In their study, Davies and Lea (1995) noted that external LOC was related to debt accumulation. In contrast, Perry and Morris (2005) found a negative association between external LOC and a person's ability to save, budget, and control spending.

2.4 Materialism

Materialism can be defined as the centrality of possession and acquisition in consumers' lives (Richins and Dawson, 1992) and material goods' possession to achieve primary life goals (Richins, 2004). Materialists can be defined as consumers who are constantly looking for their next unnecessary purchase (Richins and Dawson, 1992). Several studies examine the relationship between materialism and financial management behavior (Donnelly *et al.*, 2012; Nye and Hillyard, 2013; Adzis *et al.*, 2017). The findings of McNair *et al.* (2016) revealed an insignificant association between materialism and PFMB, contrasting the findings of Arofah *et al.* (2018) which showed a significant positive association between materialism and PFMB. Such findings also contrast with the negative association between materialism and PFMB

usually found in the literature (Nye and Hillyard, 2013; Helm *et al.*, 2019). Watson (1998) concluded that highly materialistic people have more favourable attitudes toward spending and more favourable attitudes toward debt than people with low levels of materialism.

Similarly, Watson (2003) examined how people with differing levels of materialism vary in their propensity to spend and save and their attitudes and behaviors toward borrowing money. Thus, materialism has been associated more with a specific behavior such as spending or borrowing rather than overall PFMB.

2.5 Self-control

Self-control is typically manifested as our ability to break bad habits, resist temptations, and overcome first impulses (Baumeister, 2002; Fujita *et al.*, 2006). One way to define self-control is that it constitutes the ability of our future selves to control our current self (Strömbäck *et al.*, 2017). When self-control failure occurs, people act in a non-optimal way, and they might, for example, procrastinate doing work even though they know that they would be better off spreading the workload over time (Ariely and Wertenbroch, 2002; Fudenberg and Levine, 2006). Such explanations of self-control failure align with the behavioral life-cycle (BLC) hypothesis formalized by Shefrin and Thaler (1988). According to the BLC hypothesis, people act as if there is an ongoing conflict within every person between a "planner," who thinks about the long run, and a "doer" who is more concerned about the current situation. The BLC hypothesis further states that people's financial behavior throughout life is determined by their ability to control impulses and the costs of exercising such self-control.

Studies that have explored the link between self-control and financial behavior have primarily focused on specific financial decisions, such as retirement planning, savings, or credit use (Gathergood, 2012; Achtziger *et al.*, 2015). Few studies have explored the link between self-control and broader, more general measures of financial behavior. One of the few studies

investigating a broader set of financial behaviors is Miotto and Parente (2015). They used qualitative and quantitative methods to investigate how personal characteristics, including self-control and propensity to plan for the future, affect low-middle class households' financial management. According to their study, individuals with higher self-control and a tendency to plan for the future also better manage their finances. Also, there are conflicting findings on the relationship between self-control and PFMB. Miotto and Parente (2015) and Barbić *et al.* (2019) found a significant positive association between self-control and PFMB, whereas Zulfaris *et al.* (2020) found a negative association.

3. Research methodology

3.1 Data and sample

To perform a meta-analysis, an essential primary step consists of constructing one's meta-data. For this purpose, we followed a two-step search methodology. First, we retrieved data from the two most extensive databases of indexed articles: Web of Science by Clarivate Analytics and Scopus. These two multidisciplinary databases are acknowledged to provide extensive results and advanced search options (Goyal *et al.*, 2021). The search was conducted in December 2021. We avoided limiting the search to a specific period in order to retrieve all relevant papers to date. A comprehensive long string of appropriate search terms was used to run the search in the titles, abstracts, and keywords. The search string used was "personal financ* management" OR "personal financ* behavi?r*" OR "personal financ* planning" OR "personal financ* management behavi?r*" OR "financ* management behavi?r*" OR "manag* personal financ*" OR "personal financ* decision*" OR "personal financ* outcome*" OR "household financ* management" OR "household financ* behavi?r*" OR "household financ* planning" OR "famil* financ* management" OR "famil* financ* planning" OR "famil* financ* behavi?r*" OR "individual financ* management" OR "individual financ* planning" OR "individual

financ* behavi?r*" OR "consumer financ* behavi?r*" OR "consumer financ* planning" OR "consumer financ* management" OR "money management". The search in Scopus and Web of Science databases yielded 1,168 and 515 results, respectively. Limiting the search results to English resulted in 1,122 and 507 items, respectively, totalling 1,629. Subsequently, duplicates ($n=446$) were removed, which left 1,183 items.

For the meta-analysis, we screened these items based on the scope of the paper. Upon reading the abstracts, inclusion and exclusion criteria were put in place to limit the articles according to the scope of the review. Out of 1183 papers on PFMB, 62 studies focused on the psychological antecedents of PFMB. However, some papers focused on a specific financial behavior such as savings, investment, retirement, or credit. To avoid bias in this meta-analysis, we considered only the studies whose dependent variable was the overall PFMB rather than a single financial behavior.

Further, the references of the full papers were also scanned, and relevant records were identified, which were added manually to the list after reading abstracts. Finally, we selected a set of 32 research papers that directly studied the relationship between psychological factors and PFMB and reported the correlation coefficient. These 32 research papers include 52 independent relationships because many papers had analysed more than one relationship using different independent variables. Table II summarizes the description of the 32 studies by year of publication, country, economy, sample, sample size, independent variable, dependent variable, and Pearson's r coefficient. We have different proxies for dependent variable PFMB (i.e., responsible financial management behavior, financial behavior, money management behaviors, responsible financial consumption behavior, etc.). These proxies are expected by the primary researchers to be related to the construct of interest i.e., PFMB. But, the use of proxy variables has contributed extensively to contradictory findings. Such proxies differ in terms of their measures (financial behavior components) used in the studies. The measures

used for dependent variables are also mentioned in Table II. One of the issues with existing financial management behavior measures is that many of them aren't thorough (Dew and Xiao, 2011). Although other scales exist, the majority of them lack evaluation of several aspects of financial management behavior (Xiao, 2008). There is a difference in the components of PFMB used in the various scales as many scales measure only one or two dimensions of financial behavior. For e.g. Perry and Morris (2005) include controlling spending, paying bills on time, planning for one's financial future, saving money, and providing for one's self and family in their financial behavior scale. Dew and Xiao (2011) include savings and investment, cash management, credit management, and insurance in the financial behavior scale proposed by them. On the other hand, Garðarsdóttir and Dittmar (2012) also include compulsive buying behavior in their study. This leaves questions as to the generalizability of the results. Therefore, we seek to synthesise the findings of several investigations in order to arrive at more generalizable conclusions through meta-analysis.

(Insert Table II about here)

3.2 Meta-analysis technique

Meta-analysis is instrumental in integrating quantitative research findings generated by previous studies addressing the same question: what are the psychological factors (e.g., the independent variables) that affect PFMB (e.g., the dependent variable)? Therefore, the meta-analysis determines whether a scholarly work has found significant results related to the topic of interest. Meta-analysis seemed pertinent given that most studies comprising the sample identified PFMB measures as the dependent variable and assessed many of the independent psychological variables. Since the findings of these studies were sometimes contradictory or inconclusive, meta-analyses could help summarize and clarify the inconsistent findings. The

present study followed the same procedures used by Hunter *et al.* (1982), Rosenthal (1995), Ahmed and Courtis (1999), and Khelif and Souissi (2010).

The methodology in this meta-analysis used effect size to calculate the magnitude and direction of the relationship between a dependent variable (PFMB) and various independent variables (psychological factors, i.e., financial attitude, financial self-efficacy, internal LOC, external LOC, materialism, and self-control). The impact of internal LOC on PFMB differs from the impact of external LOC in the literature. Therefore, we conducted a separate meta-analysis of internal and external LOC rather than considering LOC as a single construct. The coefficient of correlation between the dependent and independent variables of each study is used to measure effect size ($\bar{r}$). Once the r statistic is calculated for each study, the three-step methodology, suggested by Hunter *et al.* (1982), is followed to calculate mean correlation and variance. The population mean correlation coefficient ($\bar{r}$) is calculated in the first step. This is the weighted average of the studies under review's correlation coefficient ($\bar{r}$). The mean correlation is computed as follows:

$$\bar{r} = \sum (N_i r_i) / \sum N_i$$

where N_i is the sample size for study i , and r_i is the Pearson correlation coefficient for study i . This method provides a more robust aggregate estimate of the population mean correlation because studies with a large sample size are subject to minor sampling errors (Singh *et al.*, 2017). Confidence interval estimates are normally used to assess the significance of the relationship of interests. Once the mean correlation is calculated, the second step is to calculate the observed variance (S_r^2) among all individual correlation coefficients across studies by using an average squared error weighted by sample size:

$$S_r^2 = \sum [N_i(r_i - \bar{r})^2] / \sum N_i$$

This statistic estimates the total observed variance (S_r^2) in the individual correlations around the mean estimate ($\bar{r}$). The third step is to calculate the unbiased estimate of the population variance (S_p^2). Glass (1976) equated the observed variance (S_r^2) among individual correlations (r) with population variance (S_p^2). However, Hunter *et al.* (1982) argued that the observed variance (S_r^2) consists of error variance (S_e^2) due to statistical artifacts, particularly sampling error, along with the actual population variance (S_p^2). Thus, the best estimate of population variance (S_p^2) is not the observed variance (S_r^2) but the observed variance less some estimated sampling error variance (S_e^2). Accordingly, the third step is to calculate an estimate of the sampling-error variance (S_e^2):

$$S_e^2 = (1 - \bar{r})^2 K / \sum N_i$$

where K is the number of individual relationships included in the study. The estimated sampling-error variance is then subtracted from the observed variance, leaving the residual variance which provides an unbiased estimate of the population variance (S_p^2):

$$S_p^2 = S_r^2 - S_e^2$$

The population mean ($\bar{r}$) and the standard deviation (S_p^2) estimates are then used to construct a 95 percent confidence interval. Confidence intervals are constructed as follows:

$$[\bar{r} - S_p Z_{0.975}, \bar{r} + S_p Z_{0.975}] = [\bar{r} - S_p(1.96), \bar{r} + S_p(1.96)]$$

Hunter *et al.* (1982) have also considered moderating effects in the relationships. The determination of moderating effects within a set of results is based on an assessment of estimated population variance. If the residual variance is sufficiently trivial, it may be concluded that the difference between correlations is due to statistical error and not to a function of some moderator variables. A robust statistical procedure to test whether the observed variance is trivial (i.e., homogeneous) or is significantly greater than expected (i.e., heterogeneous) involves the computation of the chi-square statistic (Ahmed and Curtis, 1999). The association investigated is unmoderated when this statistic is found to be trivial. Still, a high value, generally superior to $\chi^2_{(K-1,0.05)}$, indicates the need to perform tests using subgroups meta-analysis, which represents the third and ultimate step of this approach:

$$\chi^2_{K-1} = \frac{N s_r^2}{(1 - \bar{r}^2)^2} = K \frac{s_r^2}{s_e^2}$$

Now, it is feasible to implement this procedure concerning empirical studies that do not report Pearson's coefficient r but include other statistics such as t -statistics. The following expression allows for the conversion into r statistics:

$$r_{y,x} = \sqrt{t^2 / (t^2 + df)} = |t| / \sqrt{(t^2 + df)}$$

However, judging from this equation, the sign of Pearson's coefficient r , which can play an essential role in estimating the confidence interval, remains unknown. The sign of this coefficient can also affect the evidence on the validity and strength of the relationship between PFMB and its explanatory variables. There is no clear indication in the literature of the

appropriate procedure in the case of multivariate regression in the absence of information about the sign of these two statistics (t and r statistics).

The approach based on dummy variables is adopted to address this methodological issue. First, the dummy variable d equals one if both t and $r_{y,xi}$ is associated with the same sign and zero otherwise. Thus, d follows the Bernoulli rule as expressed below:

$$P(D = d) = \begin{cases} p^d(1-p)^{1-d} & d \in \{0,1\}; \\ 0 & \text{if not} \end{cases} \quad 0 < p < 1$$

The mean and variance of this dummy variable can be expressed as $E(D) = p$ and $V(D) = p(1-p)$, respectively. Second, the following hypothesis is tested with the 95 percent confidence level:

H_0 . $p=0.9$ against.

H_1 . $p < 0.9$.

where p is the proportion of cases in which the t -statistic is associated with the same sign as $r(y, xi)$. The sample selection was performed randomly to obtain some studies from the literature, including 32 articles that report both the univariate correlation $r(y, xi)$ statistics and multivariate correlation t -student statistics. The sample resulted in a total of 99 observations, 89 of which included cases where $r(y, xi)$ statistics and t -student statistics were associated with the same sign. The frequency f of same-sign statistics amounts to $(89/99 = 0.8989)$. Finally, based on the frequency level f , it is possible to conclude at the 95 percent confidence level that there is a significant correspondence between these two statistics in 90 percent of the cases. We **do not reject** H_0 if the computed b is lower than f , as indicated below:

$$\frac{b - 0.9}{\sqrt{(0.9 \times 0.1)/99}} = -1.645 = Z_{0.05} \Rightarrow b = 0.9 - (1.645) \times \sqrt{\frac{0.9 \times 0.1}{99}}$$

$$= 0.8503 < 0.8989$$

This value indicates that the same sign shared by the t-statistics and $r(y, xi)$ statistics can be attributed to the converted statistics.

The subgroup meta-analysis is helpful in order to lessen heterogeneity and enhance the explanatory power of results. We have done a sub-group study based on the sample's age group (adults vs. young) and the country's economy (developed economy vs. developing economy). For subgroup analysis, we considered school students, college students, and young adults as young and all others as adults. The overall sample was divided into subgroups; after that, r and S_r^2 were calculated for each subgroup.

4. Empirical results

An overall meta-analysis was conducted for each psychological variable to examine its association with PFMB. Thirty-two studies, including 52 independent relationships, individually examined the association between the psychological factors and PFMB.

4.1 Financial attitude

The evidence from the total sample meta-analysis suggests that there is no significant relationship between financial attitude and PFMB (Table III). The results of the general meta-analysis for this relationship exhibit a mean correlation ($\bar{r}$) of 0.2610 (Table III, column 4) with a confidence interval of -0.2584 to 0.7805 (Table III, column 9). Although the mean correlation ($\bar{r}$) value with a positive sign confirms a positive relationship between the variables studied, this association is not statistically significant. This confirms that individuals with negative financial attitudes may still exhibit wise financial management behavior. Since the sampling variance is trivial, further analysis was undertaken to reduce heterogeneity and determine the elements that might have a more substantial impact on this association. When the sub-group

analysis was performed concerning the young and adult age groups, we did not find a significant relationship in either case because of the inclusion of zero within the confidence interval. In the case of adults, the mean correlation is found to be 0.2985 (Table III, Column 4, row 2) with a confidence interval of -0.3814 to 0.9784 (Table III, column 9-10, row 2). In the case of young, the mean correlation is 0.2550 (Table III, column 4, row 3) with a confidence interval of -0.2330 to 0.7431 (Table III, column 9-10, row 3). These results also indicate that age does not serve as a moderating variable in the relationship between financial attitude and PFMB. In the second subgroup meta-analysis, we divided the total sample into two groups, namely, developed economy and developing economy, based on the economic development in the country from which the sample was obtained. Out of 16 independent relationships, seven pertain to developed countries, and the remaining nine belong to developing economies. The mean correlation ($\bar{r}$) for developed countries is 0.0710 (Table III, column 4, row 4) with a confidence interval of -0.2853 to 0.4273 (Table III, column 9-10, row 4). The association is not significant in the case of developed countries. The mean correlation as calculated for developing countries is 0.4777 (Table III, column 4, row 5), which is higher than that for developed economies. Also, the association is statistically significant in this case because of the non-inclusion of zero within the confidence interval (0.1692 to 0.7863). These results also indicate that belonging to a developing economy is a moderating variable in the relationship between financial attitude and PFMB. Individuals from emerging countries are going through changes in their consumption patterns, and their needs for finances are also changing (Haq *et al.*, 2018). As a result of this economic growth, the income of individuals has also increased (Dutta and Sahi, 2013), and this complicated the task of money management (Garg and Singh, 2018). This might be a plausible reason for their financial attitude influencing PFMB.

(Insert Table III about here)

4.2 Financial self-efficacy

The overall meta-analysis shows no significant relationship between financial self-efficacy and PFMB (Table IV). The mean correlation ($\bar{r}$) for this relationship is 0.1438 (Table IV, column 4), with a confidence interval of -0.1872 to 0.4748 (Table IV, Column 9-10). The mean correlation ($\bar{r}$) with a positive sign shows a positive relationship between financial self-efficacy and PFMB. When the sub-group analysis was performed concerning the young and adult age groups, we did not find a significant relationship in either case. In the case of adults, the mean correlation was found to be 0.2697 (Table IV, Column 4, row 2) with a confidence interval of -0.0068 to 0.5462 (Table IV, column 9-10, row 2). In the case of the young, the mean correlation was found to be 0.1157 (Table IV, column 4, row 3) with a confidence interval of -0.2014 to 0.4329 (Table IV, column 9-10, row 3). The association is not statistically significant in either case because of the inclusion of zero within the confidence interval. Similar to the financial attitude, these results also indicate that age does not serve as a moderating variable in the relationship between financial self-efficacy and PFMB. Out of 7 independent relationships, three pertain to developed countries in the second subgroup meta-analysis, and the remaining four belong to developing economies. The mean correlation ($\bar{r}$) for developed countries is 0.0961 (Table IV, column 4, row 4) with a confidence interval of -0.2033 to 0.3955 (Table IV, column 9-10, row 4). The association is not significant in the case of developed countries. The mean correlation as calculated for developing countries is 0.2839 (Table IV, column 4, row 5), which is higher than that for developed economies. Also, the association is statistically significant in this case because of the non-inclusion of zero within the confidence interval (0.0223 to 0.5455). These results also show that in the case of individuals belonging to a developing country, financial self-efficacy significantly influences PFMB. Self-efficacy is a dynamic attribute that an individual may possess in various contexts, and hence it can be altered by specific individual behavior, biological events, and the environment within which

he or she interacts (Stajkovic and Luthans, 1998). As the developing economies face continuous changes in their financial markets, change in individuals' financial self-efficacy may influence the way they manage their finances.

(Insert Table IV about here)

4.3 Internal LOC

The overall meta-analysis shows no significant relationship between internal LOC and PFMB (Table V). The mean correlation ($\bar{r}$) for this relationship is 0.3124 (Table V, column 4), with a confidence interval of -0.3505 to 0.9753 (Table V, Column 9-10). The mean correlation ($\bar{r}$) with a positive sign shows a positive relationship between internal LOC and PFMB. When the sub-group analysis was performed concerning the young and adult age groups, we did not find a significant relationship in the case of adults. The mean correlation was found to be 0.2903 (Table V, Column 4, row 2) with a confidence interval of -0.1658 to 0.7464 (Table V, column 9-10, row 2). In the case of the young, the mean correlation is 0.3940 (Table V, column 4, row 3) with a confidence interval of -0.4646 to 0.3235 (Table V, column 9-10, row 3). The association is statistically significant in this case because of the non-inclusion of zero within the confidence interval. These results indicate that age is a moderating variable in the relationship between internal LOC and PFMB). Individuals with an internal LOC generally expect that their actions will produce predictable outcomes. Thus, they are more action-oriented or motivated than externals (Hoffman *et al.*, 2000), a tendency which is generally more prevalent in young individuals than in their older counterparts. The young population represents a unique transitional stage in development between near-total dependence on family in adolescence and near total independence as they move into young adulthood (Arnett 2001). Emerging adults report individualistic qualities as the most critical benchmarks in attaining full adulthood—specifically, qualities such as accepting responsibility for one's actions (Jorgensen *et al.*, 2017). Out of 7 independent relationships, three pertain to developed countries in the

second subgroup meta-analysis, and the remaining four belong to developing economies. The mean correlation ($\bar{r}$) for developed countries is 0.2060 (Table V, column 4, row 4) with a confidence interval of -0.2354 to 0.6474 (Table V, column 9-10, row 4). The association is not significant in the case of developed countries. The mean correlation as calculated for developing countries is 0.4511 (Table V, column 4, row 5), which is higher than that for developed economies. Also, the association is statistically significant in this case because of the non-inclusion of zero within the confidence interval (0.3685 to 0.5338). These results show that a country's economy also acts as a moderating variable in the relationship between internal LOC and PFMB.

(Insert Table V about here)

4.4. External LOC

The overall meta-analysis shows no significant relationship between external LOC and PFMB (Table VI). The mean correlation ($\bar{r}$) for this relationship is -0.0994 (Table VI, column 4), with a confidence interval of -0.2397 to 0.0409 (Table VI, Column 9-10). The mean correlation ($\bar{r}$) with a negative sign shows a negative relationship between external LOC and PFMB. When the sub-group analysis was performed concerning the young and adult age groups, we did not find a significant relationship in either case. In the case of adults, the mean correlation was found to be 0.0947 (Table VI, Column 4, row 2), with a confidence interval of -0.2037 to 0.1000 (Table VI, column 9-10, row 2). In the case of the young, the mean correlation is -0.0552 (Table VI, column 4, row 3) with a confidence interval of -0.7005 to 0.5900 (Table VI, column 9-10, row 3). The association is not statistically significant in either case because of the inclusion of zero within the confidence interval. Similar to the financial attitude and financial self-efficacy, these results also indicate that age does not serve as a moderating variable in the relationship between external LOC and PFMB. Out of 5 independent

relationships, three pertain to developed countries in the second subgroup meta-analysis, and the remaining two belong to developing economies. The mean correlation ($\bar{r}$) for developed countries is -0.1014 (Table VI, column 4, row 4) with a confidence interval of -0.1268 to -0.0760 (Table VI, column 9-10, row 4). The association is significant in the case of developed countries. Locus of control was found to be different among various ethnic backgrounds as some cultures depict varying risk tolerance levels (Bapat, 2020). This might be the reason that external LOC influences PFMB for individuals in developed countries. The mean correlation as calculated for developing countries was found to be -0.0552 (Table VI, column 4, row 5). But the association is not statistically significant in this case because of the inclusion of zero within the confidence interval (-0.7005 to 0.5900).

(Insert Table VI about here)

4.5. Materialism

The overall meta-analysis shows no significant relationship between materialism and PFMB (Table VII). The mean correlation ($\bar{r}$) for this relationship is 0.0684 (Table VII, column 4) with a confidence interval of -0.3662 to 0.2295 (Table VII, Column 9-10). The mean correlation ($\bar{r}$) with a negative sign shows a negative relationship between materialism and PFMB. When the sub-group analysis was performed concerning the young and adult age groups, we found a significant relationship in the case of adults. The mean correlation was found to be -0.2323 (Table VII, Column 4, row 2) with a confidence interval of -0.3522 to -0.1125 (Table VII, column 9-10, row 2). Generally, the effect of materialism on the responsible financial behavior of the young lies in recognizing that they are more prone to it and are most likely to immediately shift to self-gratification (Lučić *et al.*, 2021). Therefore, these persons are also prone to make ineffective financial decisions and vulnerable to irresponsible financial behavior (Barbić *et al.*, 2019). Surprisingly, the materialistic tendency of adults influences their PFMB instead of young individuals. In the case of the young, the mean correlation is -0.0083 (Table

VII, column 4, row 3) with a confidence interval of -0.0770 to 0.0935 (Table VII, column 9-10, row 3). The association is not statistically significant in this case because of the inclusion of zero within the confidence interval. These results indicate that age is a moderating variable in the relationship between materialism and PFMB. In the second subgroup meta-analysis, nine out of 11 independent relationships pertain to developed countries, and the remaining two belong to developing economies. The mean correlation ($\bar{r}$) for developed countries is -0.1124 (Table VII, column 4, row 4) with a confidence interval of -0.3912 to 0.1664 (Table VII, column 9-10, row 4). The association is not significant in the case of developed and developing countries. The mean correlation as calculated for developing countries is 0.0000 (Table VII, column 4, row 5). Also, the association is not statistically significant in this case because of the inclusion of zero within the confidence interval (-0.4143 to 0.4143). Therefore, the economy does not act as a moderating variable in the association between materialism and PFMB.

(Insert Table VII about here)

4.6 Self-control

The general meta-analysis shows a significant relationship between self-control and PFMB (Table VIII). The mean correlation ($\bar{r}$) for this relationship is 0.2089 (Table VIII, column 4) with a confidence interval of 0.1580 to 0.2582 (Table VIII, Column 9-10). The mean correlation ($\bar{r}$) with a positive sign shows a positive relationship between self-control and PFMB. This indicates that individuals with good self-control are more likely to save money from every paycheck and have better general financial behavior. Also, they are less worried about financial matters and feel more secure about their current and future financial situation. When the sub-group analysis was performed concerning the young and adult age groups, we found a significant relationship in the case of adults. The mean correlation was found to be 0.2099 (Table VIII, Column 4, row 2) with a confidence interval of 0.0418 to 0.3779 (Table

VIII, column 9-10, row 2). In the case of the young, the mean correlation is 0.1931 (Table VIII, column 4, row 3) with a confidence interval of -0.0603 to 0.4465 (Table VIII, column 9-10, row 3). The association is not statistically significant in the case of young people because zero within is the confidence interval. These results indicate that age serves as a moderating variable in the relationship between self-control and PFMB. In the second subgroup meta-analysis, three out of 6 independent relationships pertain to developed countries, and the remaining three belong to developing economies. The mean correlation ($\bar{r}$) for developed countries is 0.2450 (Table VIII, column 4, row 4) with a confidence interval of 0.1128 to 0.3771 (Table VIII, column 9-10, row 4). The association is significant in the case of developed countries. The mean correlation as calculated for developing countries is 0.1002 (Table VIII, column 4, row 5). Also, the association is not statistically significant in this case because of the inclusion of zero within the confidence interval (-0.0214 to 0.2219).

(Insert Table VIII about here)

5. Conclusion

This meta-analysis assimilates findings of prior empirical studies about the impact of psychological factors on PFMB. The results of this analysis underpin the role of self-control as a leading determinant of PFMB. Individuals who experience self-control failure make impulsive decisions such as compulsive purchasing (Strömbäck *et al.*, 2017); as a result, their level of self-control may have a significant impact on their financial behavior and well-being. Findings are summarized in Table IX. All-embracing and in all subgroup analyses, this association is not statistically significant in all of the cases and differs in magnitude. Self-control (positively) and materialism (negatively) were found to be significantly associated with PFMB among adults. In contrast, the association between internal LOC and PFMB is significant and positive among the young. The role of locus of control is consistent with

transtheoretical model of behavior change which suggests that internal locus of control plays a crucial role in behavioral change (Prochaska and DiClemente, 2005). Self-control appeared to be significantly and positively associated with PFMB in developed countries. In developing countries, financial attitude, financial self-efficacy, and internal LOC are significantly and positively associated with PFMB. The essence of this meta-analysis is latent in the evidence that variegated and contrasting results were found when we aggregated the findings on the influence of prominent psychological factors on PFMB. In addition, the overall meta-analysis also assigns a significant value to the chi-square statistic, which confirms the effect of moderating variables on the relationship. We found the interesting moderating influence of age group (young and adults) and economy (developed and developing) on the linkage between various psychological factors and PFMB. This provides conclusive evidence that the influence of psychological attributes may not necessarily be the same among all the individuals and the economy to which they belong. It also stages a call for future researchers to elicit research evidence on the psychological determinants of PFMB based on specific age cohorts and cross-country comparisons. It also highlights the need for stronger designs in future research. The use of dubious proxy variables for PFMB made it more difficult to interpret the literature. Unfortunately, most existing studies only evaluate financial behaviors when it is convenient for them, and they lack a comprehensive composition. Because there are so few validated financial management behavior scales in the study, researchers must create a financial behaviors inventory that covers all aspects of activity uniformly (Dew and Xiao, 2011; Goyal *et al.*, 2021).

(Insert Table IX about here)

Our study holds practical implications for financial planning professionals, advisors, and consumers. In particular, by developing an understanding of the influence of psychological traits on PFMB, regulators and policymakers can wisely channel the limited educational and

counselling resources to address the issue of incommensurate personal financial planning. It encourages these counsellors to take a more advanced and practical approach, focusing not just on demographics but also on other psychological characteristics. Over the last few decades, policymakers and educators have launched a slew of initiatives to encourage prudent financial behavior among the general public. While the primary goal of such programmes has been to disseminate objective financial knowledge, it has only lately been recognised that psychological traits and non-cognitive skills play a role in explaining individual differences in financial behavior. We contribute to the body of knowledge by looking into the impact of psychological differences in predicting financial behavior. Recent studies on the financial vulnerability of distressed consumers suggest that the target programs that are often created to assist them in their navigation through the financial marketplace fail due to a weak understanding of how consumers' financial distress and perception function differently among Western and emerging economies (Martin and Hill, 2015) and how the psychology of different age groups is manifested. From a practical perspective, our research addresses an urgent need for financial market regulators and consumer policymakers worldwide to get a better understanding of PFMB. The results reveal that the financial behaviors stem from deeply embedded psychological traits like self-control, financial attitude, materialism, LOC, and financial self-efficacy. Therefore, the programs should be directed to view financial knowledge beyond the bounds to manoeuvre completely and efficiently transform knowledge into responsible financial behavior. Additionally, opportunities should be created to augment self-control and other psychological attributes. Doing so is important given the ever-increasing responsibility placed on individuals for managing their finances and procuring good financial health.

From a theoretical perspective, our results make a significant contribution. When examining economic theories, researchers are frequently confronted with a large quantity of

behavioral heterogeneity. Behavioral and experimental economics aims to better understand human behaviour via observation so that economic theories can be improved. One method to handle this heterogeneity is to realise that decision-makers differ fundamentally from one another and that these differences contribute to observable financial behavior differences. This study's goal was to understand the diverse non-cognitive processes that underpin financial behavior, with a particular focus on psychological factors. To the best of our knowledge, no study in the literature has attempted to quantitatively synthesize the findings on this topic. One limitation of our study is that the findings were based on only a limited number of available studies for some subgroups. Therefore, researchers must consider further extending this meta-analysis by incorporating additional empirical evidence available. Also, we have not included of all the psychological variables in our study due to the availability of some studies. It will also be quite valuable if additional studies are performed to confirm the relationships analysed and consider other variables. There are numerous antecedents of PFMB, such as social factors, financial literacy, cultural factors, technological factors, demographic factors, etc. (Goyal *et al.*, 2021). Scholars can also conduct a comprehensive meta-analysis considering these antecedents of PFMB. They can also confirm the findings of our meta-analysis by using different methodology, such as Fisher's Z transformation (Hedges and Olkin, 1985).

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Table I. List of psychological antecedents of PFMB apart from those included in this meta-analysis

Variable	Number of Studies	Reference Study	Citations
Coping Strategy (Acceptance coping, active coping, denial coping, emotional coping)	1	Individual-level factors predicting consumer financial behavior at a time of high pressure	McNair <i>et al.</i> (2016)
Thinking Style (Affective experiential, analytical rational)	1	Struggling to make ends meet: can consumer financial behaviors improve?	Meneau and Moorthy (2021)
Personality Traits (Agreeableness, conscientiousness, agreeableness, openness to experience, extraversion)	1	The Big Five personality traits, material values, and financial well-being of self-described money managers	Donnelly <i>et al.</i> (2012)
Decision Making Style (Analytical, deliberative, intuitive)	2	Consumer centric antecedents to personal financial planning Does self-control predict financial behavior and financial well-being?	Guzman <i>et al.</i> (2019) Strömbäck <i>et al.</i> (2017)
Emotional Intelligence	1	The influence of financial information, financial self-efficacy, and emotional intelligence to financial management behavior of female lecturer	Asandimitra and Kautsar (2019)
Financial Risk Tolerance	3	A model for personal financial planning towards retirement Antecedents to responsible financial management behavior among young adults: moderating role of financial risk tolerance Consumer centric antecedents to personal financial planning	Herrador-Alcaide <i>et al.</i> (2021) Bapat (2020) Guzman <i>et al.</i> (2019)
Generalized Anxiety	1	The Moderating Effect of Generalized Anxiety and Financial Knowledge on Financial Management Behavior	Grable <i>et al.</i> (2020)
Need for Cognitive Closure	1	Financial management behavior among young adults: The role of need for cognitive closure in a three-wave moderated mediation model	Topa <i>et al.</i> (2018)
Optimism	2	A model for personal financial planning towards retirement Does self-control predict financial behavior and financial well-being?	Herrador-Alcaide <i>et al.</i> (2021) Strömbäck <i>et al.</i> (2017)
Preference for Credit	1	Antecedents and consequences of household financial management in Brazilian lower-middle-class	Miotto and Parente (2015)

Procrastination	1	Procrastination and personal finances: Exploring the roles of planning and financial self-efficacy	Gamst-Klaussen <i>et al.</i> (2019)
Propensity to Plan	2	Antecedents and consequences of household financial management in Brazilian lower-middle-class	Miotto and Parente (2015)
		Procrastination and personal finances: Exploring the roles of planning and financial self-efficacy	Gamst-Klaussen <i>et al.</i> (2019)
Self Esteem	1	Self-esteem, financial knowledge and financial behavior	Tang and Baker (2016)
Self-orientation (and significant other orientation)	1	Consumer centric antecedents to personal financial planning	Guzman <i>et al.</i> (2019)
Time orientation	3	Consumer centric antecedents to personal financial planning	Guzman <i>et al.</i> (2019)
		An investigation of financial literacy, money ethics and time preferences among college students: a structural equation model	Aydin and Selcuk (2019)
		Present bias and financial behavior	Xiao and Porto (2019)

Table II. Description of studies included in meta-analysis

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
1	Explaining financial management behavior for koreans living in the united states	Grable <i>et al.</i> (2009)	Korea	Developed	Adults	153	External Locus of Control	Rotter (1975)	Responsible Financial Management Behavior	Perry and Morris (2005)	-0.272
2	Factors affecting financial management behaviour among university students	Chuah <i>et al.</i> (2020)	Malaysia	Developing	College Students	272	External Locus of Control	Rotter (1966)	Financial Behavior	Dew and Xiao (2011)	0.30
							Financial Attitude	Tang (1995)	Financial Behavior	Dew and Xiao (2011)	0.491
							Financial Self-efficacy	Lown (2011)	Financial Behavior	Dew and Xiao (2011)	0.454
3	Individual-level factors predicting consumer financial behavior at a time of high pressure	McNair <i>et al.</i> (2016)	UK	Developed	Adults	294	External Locus of Control	Lumpkin (1985)	Money Management Behaviors	Garðarsdóttir and Dittmar (2012)	-0.14
							Financial Attitude	Rick <i>et al.</i> (2008)	Money Management Behaviors	Garðarsdóttir and Dittmar (2012)	-0.42
							Internal Locus of Control	Lumpkin (1985)	Money Management Behaviors	Garðarsdóttir and Dittmar (2012)	0.28
							Materialism	Richins and Dawson (1992)	Money Management Behaviors	Garðarsdóttir and Dittmar (2012)	-0.30
4	Who is in control? the role of self-perception, knowledge, and income in explaining consumer financial behavior	Perry and Morris (2005)	USA	Developed	Adults	11862	External Locus of Control	Rotter (1975)	Responsible Financial Management Behavior	Perry and Morris (2005)	-0.0983

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
5	Factors Affecting Personal Financial Management Behaviors: Evidence From Vietnam	Mien and Thao (2015)	Vietnam	Developing	Young Adults	307	External Locus of Control	Rotter (1966)	Personal Financial Management Behavior	Dew and Xiao (2011)	-0.37
							Financial Attitude	Rajna <i>et al.</i> (2011)	Personal Financial Management Behavior	Dew and Xiao (2011)	0.803
6	Antecedents to responsible financial management behavior among young adults: moderating role of financial risk tolerance	Bapat (2020)	India	Developing	Young Adults	584	Financial Attitude	Chen and Volpe (1998)	Financial Management Behavior	Dew and Xiao (2011)	0.122
							Internal Locus of Control	Grable <i>et al.</i> (2009)	Financial Management Behavior	Dew and Xiao (2011)	0.381
7	Integrating positive financial attitudes to nurture students' identity as informed financial decision-makers in high power distance Chinese contexts	Ho and Lee (2021)	China	Developing	School Students	1164	Financial Attitude	OECD (2018)	Financial Behavior in spending	OECD (2018)	0.485
							Financial Attitude	OECD (2018)	Financial Behavior in Planning	OECD (2018)	0.582
							Financial Attitude	OECD (2018)	Financial Behavior in Protection	OECD (2018)	0.493
8	Measuring responsible financial consumption behaviour	Barbić <i>et al.</i> (2019)	Croatia	Developing	Adults	494	Financial Attitude	Ajzen (2002)	Responsible Financial Consumption Behavior	Barbić <i>et al.</i> (2019)	0.282
							Self -Control	Nysveen <i>et al.</i> (2005)	Responsible Financial Consumption Behavior	Barbić <i>et al.</i> (2019)	0.06
9	An investigation of financial literacy, money	Aydin and Selcuk (2019)	Turkey	Developed	College Students	1443	Financial Attitude	Atkinson and Messy (2012)	Financial Behavior	Atkinson and Messy, 2012; Shim <i>et al.</i> , 2009	-0.004

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
	ethics and time preferences among college students: a structural equation model						Money Ethic Evil (Affective)	Tang (1995)	Financial Behavior	Atkinson and Messy, 2012; Shim <i>et al.</i> , 2009	-0.063
							Money Ethic Success (Cognitive)	Tang (1995)	Financial Behavior	Atkinson and Messy, 2012; Shim <i>et al.</i> , 2009	0.043
							Money Ethic Budget (Behavioral)	Tang (1995)	Financial Behavior	Atkinson and Messy, 2012; Shim <i>et al.</i> , 2009	0.247
10	How knowledge and financial self-efficacy moderate the relationship between money attitudes and personal financial management behavior	Qamar <i>et al.</i> (2016)	USA	Developed	College Students	500	Financial Attitude	Klontz <i>et al.</i> (2008)	Personal Financial Management Behavior	Dew and Xiao (2011)	0.396
							Financial Self-efficacy	Lown (2011)	Personal Financial Management Behavior	Dew and Xiao (2011)	0.256
11	The impact of financial attitudes and knowledge on financial management and satisfaction of recently married individuals	Parrotta and Johnson (1998)	USA	Developed	Married	184	Financial Attitude	Godwin (1994)	Financial Management Practices	Fitzsimmons <i>et al.</i> (1993)	0.45
12	The effect of financial knowledge and financial attitude on financial management behavior mediated with locus of control	Agustina and Mardiana (2020)	Indonesia	Developing	College Faculty	270	Financial Attitude	Tang (1995)	Financial Management Behavior	Dew and Xiao (2011)	0.392
							Internal Locus of control	Rotter (1975)	Financial Management Behavior	Dew and Xiao (2011)	0.503
13	Psychological beliefs and financial well-	She <i>et al.</i> (2022)	Malaysia	Developing	Adults	500	Financial Attitude	Davis and Hustvedt (2012)	Financial Behavior	Dew and Xiao (2011)	0.631

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
	being among working adults: the mediating role of financial behaviour						Internal Locus of Control	Sapp and Harrod (1993)	Financial Behavior	Dew and Xiao (2011)	0.508
14	Procrastination and personal finances: Exploring the roles of planning and financial self-efficacy	Gamst-Klaussen <i>et al.</i> (2019)	Norway	Developed	Adults	500	Financial Self-efficacy	Lown (2011)	Financial Behavior	Spinella <i>et al.</i> (2007); Nye and Hillyard (2013)	0.37
15	The influence of financial information, financial self-efficacy, and emotional intelligence to financial management behavior of female lecturer	Asandimitra and Kautsar (2019)	Indonesia	Developing	Women	210	Financial Self-efficacy	Lown (2011)	Financial Management Behavior	Dew and Xiao (2011)	0.028
16	Factors That Influence Financial Behavior Among Accounting Students in Bali.	Herawati <i>et al.</i> (2018)	Indonesia	Developing	College Students	518	Financial Self-efficacy	Lown (2011)	Financial Behavior	Danes and Haberman (2007)	0.298
17	The Role of Financial Self-Efficacy Scale in Predicting Financial Behavior	Ismail <i>et al.</i> (2017)	Malaysia	Developing	Adults	30	Financial Self-efficacy	Lown (2011)	Financial Behavior	Ahmad <i>et al.</i> (2010)	0.29
18	The relation between financial knowledge, attitudes towards	Amagir <i>et al.</i> (2018)	Netherlands	Developed	High School Students	2025	Financial Self-efficacy	Amagir <i>et al.</i> (2018)	Financial Behavior	Amagir <i>et al.</i> (2018)	-0.011

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
	money, financial self-efficacy, and financial behavior among high school students in the Netherlands										
19	The moderator effect of financial literacy on the relationship between locus of control and financial behavior	Mutlu and Özer (2021)	Turkey	Developed	Investors	1347	Internal Locus of Control	Perry and Morris (2005)	Financial Behavior	Dew and Xiao (2011)	0.315
20	Exploring the Antecedents of Financial Behavior for Asians and Non-Hispanic Whites: The Role of Financial Capability and Locus of Control	Grable <i>et al.</i> (2015)	USA	Developed	Adults	333	Internal Locus of Control	Perry and Morris (2005)	Financial Behavior	Dew and Xiao (2011)	-0.30
21	Exploring the Relationship Between Locus of Control and Financial Behavior of Accounting Student from The Social Construction Theory Approach	Radianito <i>et al.</i> (2021)	Indonesia	Developing	Young Adults	159	Internal Locus of Control	Ferguson (1993)	Financial Behavior	Potrich <i>et al.</i> (2015)	0.442
22	Personal financial behavior: the	Nye and Hillyard (2013)	USA	Developed	Consumers	267	Materialism	Richins (2004)	Personal Financial Behavior	Dew and Xiao (2011)	-0.261

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
	influence of quantitative literacy and material values										
23	The Big Five personality traits, material values, and financial well-being of self-described money managers	Donnelly <i>et al.</i> (2012)	USA	Developed	Adults	201	Materialism (Happy)	Richins and Dawson (1992)	Financial Management Behavior	Dew and Xiao (2011); Garðarsdóttir and Dittmar (2012)	−0.32
							Materialism (Success)	Richins and Dawson (1992)	Financial Management Behavior	Dew and Xiao (2011); Garðarsdóttir and Dittmar (2012)	−0.16
							Materialism (Centrality)	Richins and Dawson (1992)	Financial Management Behavior	Dew and Xiao (2011); Garðarsdóttir and Dittmar (2012)	−0.08
24	Financial Literacy, Materialism and Financial Behavior	Arofah <i>et al.</i> (2018)	Indonesia	Developing	College Students	129	Materialism	Richins (2004)	Financial Behavior	Danes and Haberman (2007)	0.508
25	The power of materialism among young adults: exploring the effects of values on impulsiveness and responsible financial behavior	Lučić <i>et al.</i> (2021)	Croatia	Developed	Young adults	483	Materialism (Success)	Richins and Dawson (1992)	Responsible Financial Behavior	Barbić <i>et al.</i> (2019)	0.042
							Materialism (Centrality)	Richins and Dawson (1992)	Responsible Financial Behavior	Barbić <i>et al.</i> (2019)	−0.16
							Materialism (Happiness)	Richins and Dawson (1992)	Responsible Financial Behavior	Barbić <i>et al.</i> (2019)	0.045
26	Factors influencing young adults' debt in Malaysia	Adzis <i>et al.</i> (2017)	Malaysia	Developing	Young Adults	629	Materialism	Richins and Dawson (1992)	Money management	Lea <i>et al.</i> (1995); Loke <i>et al.</i> (2015)	0.064
27	Materialist values, financial and pro-environmental	Helm <i>et al.</i> (2019)	USA	Developed	Young Adults	968	Materialism	Goldberg <i>et al.</i> (2003)	Proactive Financial Behavior	Serido <i>et al.</i> (2010)	−0.10

S.no	Title	Study Reference	Country of sample	Nature of economy	Sample	Sample size of study	Independent variable	Measure of independent variable used in the study	Dependent Variable	Measure of dependent variable used in the study	Pearson's r coefficient
	behaviors, and well-being										
28	Antecedents and consequences of household financial management in Brazilian lower-middle-class	Miotto and Parente (2015)	Brazil	Developing	Women Lower Middle Class Customers	165	Self- Control	Tangney <i>et al.</i> (2004)	Financial Management	Antonides <i>et al.</i> (2011)	0.274
29	Struggling to make ends meet: can consumer financial behaviors improve?	Meneau and Moorthy (2021)	USA	Developed	Adults	241	Self- Control	Tangney <i>et al.</i> (2004); Antonides <i>et al.</i> (2011)	Consumer Financial Behavior	Dew and Xiao (2011)	0.027
30	Students and money management behavior of a Malaysian public university	Zulfaris and Mustafa (2020)	Malaysia	Developing	College Students	186	Self- Control	Sabri and MacDonald (2010)	Money Management	Sabri and MacDonald (2010)	0.053
31	Does self-control predict financial behavior and financial well-being?	Strömbäck <i>et al.</i> (2017)	Sweden	Developed	Adults	2063	Self- Control	Tangney <i>et al.</i> (2004)	Financial Behavior	Dew and Xiao (2011)	0.262
32	Subjective self-control but not objective measures of executive functions predicts financial behavior and well-being	Strömbäck <i>et al.</i> (2020)	Sweden	Developed	Students	166	Self- Control	Tangney <i>et al.</i> (2004)	Financial Management Behavior	Dew and Xiao (2011)	0.35

Table III. Results of financial attitude

	N	K	$\bar{r}$	S_r^2	S_e^2	S_p^2	S_e^2/S_r^2	UL	LL	χ^2_{K-1}
	(sample size)	(No of relationships)						(Upper limit)	(Lower Limit)	
General meta-analysis	12669	16	0.2610	0.0713	0.0011	0.0702	1.5372	0.7805	-0.2585	1040.86*
Adults	1742	5	0.2985	0.1227	0.0024	0.1203	1.9407	0.9784	-0.3814	257.63*
Young	10927	11	0.2550	0.0629	0.0009	0.0143	1.4308	0.7431	-0.2330	768.78*
Developed Country	6750	7	0.0710	0.0341	0.0010	0.0330	3.0132	0.4273	-0.2853	232.31*
Developing Country	5919	9	0.4778	0.0257	0.0009	0.0248	3.5249	0.7863	0.1692	255.33*

Notes: Chi square statistics significant at 0.05 level of confidence interval. Significant figures represent that the association investigated is moderated and indicate the need to perform the tests using sub-groups meta-analysis. For assessing whether association between independent variable and dependent variable is significant, see if 0 comes between UL and LL which implies relationship is significant, otherwise not.

Table IV. Results of financial self-efficacy

	N (sample size)	K (No of relationships)	$\bar{r}$	S_r^2	S_e^2	S_p^2	S_e^2/S_r^2	UL (Upper limit)	LL (Lower Limit)	χ^2_{K-1}
General meta-analysis	4055	7	0.1438	0.0302	0.0017	0.0285	5.4871	0.4748	-0.1872	127.58*
Adults	740	3	0.2697	0.0234	0.0035	0.0199	14.9011	0.5462	-0.0068	20.13*
Young	3315	4	0.1157	0.0274	0.0012	0.0262	4.2931	0.4329	-0.2014	93.17*
Developed Country	3025	3	0.0961	0.0243	0.0010	0.0233	4.0054	0.3955	-0.2033	74.90*
Developing Country	1030	4	0.2839	0.0211	0.0033	0.0178	15.5626	0.5455	0.0223	25.70*

Notes: Chi square statistics significant at 0.05 level of confidence interval. Significant figures represent that the association investigated is moderated and indicate the need to perform the tests using sub-groups meta-analysis. For assessing whether association between independent variable and dependent variable is significant, see if 0 comes between UL and LL which implies relationship is significant, otherwise not.

Table V. Results of internal locus of control

	N	K	$\bar{r}$	S_r^2	S_e^2	S_p^2	S_e^2/S_r^2	UL	LL	χ^2_{K-1}
	(sample size)	(No of relationships)						(Upper limit)	(Lower Limit)	
General meta-analysis	3487	7	0.3124	0.1160	0.0016	0.1144	1.4090	0.9753	-0.3505	496.80*
Adults	2744	5	0.2903	0.0557	0.0015	0.0542	2.7440	0.7464	-0.1658	182.21*
Young	743	2	0.3941	0.0006	0.0019	-0.0013	100#	0.3235	0.4646	0.65
Developed Country	1974	3	0.2060	0.0521	0.0014	0.0507	2.6739	0.6475	-0.2354	112.20*
Developing Country	1513	4	0.4512	0.0035	0.0017	0.0018	48.5255	0.5338	0.3685	8.24*

Notes: #since error variance (S_e^2) is higher than observed variance (S_r^2), a zero residual variance (S_p^2) is used to determine the confidence interval. Chi square statistics significant at 0.05 level of confidence interval. Significant figures represent that the association investigated is moderated and indicate the need to perform the tests using sub-groups meta-analysis. For assessing whether association between independent variable and dependent variable is significant, see if 0 comes between UL and LL which implies relationship is significant, otherwise not.

Table VI. Results of external locus of control

	N	K	$\bar{r}$	S_r^2	S_e^2	S_p^2	S_e^2/S_r^2	UL	LL	χ^2_{K-1}
	(sample size)	(No of relationships)						(Upper limit)	(Lower Limit)	
General meta-analysis	12888	5	-0.0994	0.0055	0.0004	0.0051	6.9110	0.0409	-0.2397	72.35*
Adults	12309	3	0.0947	0.0101	0.0002	0.0099	2.3670	0.1000	-0.2037	126.74*
Young	579	2	-0.0553	0.1118	0.0034	0.1084	3.0704	0.5900	-0.7005	65.14*
Developed Country	12309	3	-0.1015	0.0004	0.0002	0.0002	58.7128	-0.0761	-0.1269	5.11
Developing Country	579	2	-0.0553	0.1118	0.0034	0.1084	3.0704	0.5900	-0.7005	65.14*

Notes: Chi square statistics significant at 0.05 level of confidence interval. Significant figures represent that the association investigated is moderated and indicate the need to perform the tests using sub-groups meta-analysis. For assessing whether association between independent variable and dependent variable is significant, see if 0 comes between UL and LL which implies relationship is significant, otherwise not.

Table VII. Results of materialism

	N	K	$\bar{r}$	S_r^2	S_e^2	S_p^2	S_e^2/S_r^2	UL	LL	χ^2_{K-1}
	(sample size)	(No of relationships)						(Upper limit)	(Lower Limit)	
General meta-analysis	4339	11	-0.0684	0.0256	0.0025	0.0231	9.8074	0.2295	-0.3663	112.16*
Adults	1164	5	-0.2323	0.0076	0.0038	0.0037	50.6978	-0.1125	-0.3522	9.86*
Young	3175	6	-0.0083	0.0187	0.0019	-0.0019	10.0786	-0.0935	0.0770	59.53*
Developed Country	3581	9	-0.1124	0.0227	0.0025	0.0202	10.8017	0.1664	-0.3912	83.32*
Developing Country	758	2	0.0000	0.0473	0.0026	0.0447	5.5763	0.4143	-0.4143	35.86*

Notes: Chi square statistics significant at 0.05 level of confidence interval. Significant figures represent that the association investigated is moderated and indicate the need to perform the tests using sub-groups meta-analysis. For assessing whether association between independent variable and dependent variable is significant, see if 0 comes between UL and LL which implies relationship is significant, otherwise not.

Table VIII. Results of self-control

	N	K	$\bar{r}$	S_r^2	S_e^2	S_p^2	S_e^2/S_r^2	UL	LL	χ^2_{K-1}
	(sample size)	(No of relationships)						(Upper limit)	(Lower Limit)	
General meta-analysis	3315	6	0.2089	0.0024	0.0017	0.0007	69.1460	0.2582	0.1580	8.68
Adults	2963	4	0.2099	0.0086	0.0012	0.0074	14.3686	0.3779	0.0418	27.84*
Young	352	2	0.1931	0.0220	0.0053	0.0167	23.9577	0.4465	-0.0603	8.35*
Developed Country	2470	3	0.2450	0.0056	0.0011	0.0045	19.0978	0.3771	0.1128	15.71*
Developing Country	845	3	0.1002	0.0073	0.0035	0.0039	47.4442	0.2219	-0.0214	6.32*

Notes: Chi square statistics significant at 0.05 level of confidence interval. Significant figures represent that the association investigated is moderated and indicate the need to perform the tests using sub-groups meta-analysis. For assessing whether association between independent variable and dependent variable is significant, see if 0 comes between UL and LL which implies relationship is significant, otherwise not.

Table IX. A summary of meta-analysis results

	General Meta- analysis	Sub-group analysis			
Psychological antecedent	Direct association with PFMB	Adults	Young	Developed country	Developing country
Financial attitude	Insignificant	Insignificant	Insignificant	Insignificant	Significant (Positive)
Financial self-efficacy	Insignificant	Insignificant	Insignificant	Insignificant	Significant (Positive)
Internal locus of control	Insignificant	Insignificant	Significant (Positive)	Insignificant	Significant (Positive)
External locus of control	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
Materialism	Insignificant	Significant (Negative)	Insignificant	Insignificant	Insignificant
Self-control	Significant (Positive)	Significant (Positive)	Insignificant	Significant (Positive)	Insignificant

Notes: Summary of the results of our meta-analysis study.