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Mediation gap between mental accounting and financial education evidenced by a scoping review

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Abstract

Financial education is a central instrument of policies aimed at household financial well-being, yet meta-analytic evidence shows that standalone interventions explain little of the variance in financial behavior. Formal knowledge, however, passes through the filter of the mental accounts in which each person sorts resources, so that part of what is taught may never reach the decision. This study aimed to map the analytical configurations through which Scopus-indexed research links mental accounting and financial education between 2015 and 2025, by means of a scoping review, in order to estimate how often the pathway running from financial education through mental-account structure to observed behavior is actually tested. Following PRISMA-ScR, with a protocol registered in the Open Science Framework, we read the full text of 139 articles and coded the functional role of both constructs, synthesizing the resulting map through the Theory–Context–Characteristics–Methods framework. The two constructs share the same model in fewer than one article in five, financial education alone receives an analytical position in 51.1%, mental accounting mediates in 2.9%, and the complete pathway, in 1.4%. The modal configuration (30.2%) measures financial education as an outcome with mental accounting outside the model, and mental accounting is operationalized in 40 of the 139 articles, against 97 for financial education (OR 5.7; 95% CI 3.3 to 9.9), so that the field assesses education without measuring the mental accounting that links knowledge to behavior. The agenda thus begins with a validated instrument for mental-account structure.

JEL Classification: D14 · G41 · G53

1 Introduction

Financial decisions observed in practice depart systematically from the predictions of full-rationality models (Kahneman and Tversky 1979; Barberis and Thaler 2003), with consequences for consumption, saving, indebtedness, and investment. This divergence gained relevance as access to credit, insurance, and investment products expanded (Lusardi and Mitchell 2014; OECD INFE 2016), a process that increased the frequency and magnitude of individual economic choices and turned decision behavior into a shared object of study for economics and psychology.

Prospect theory indicated that gains and losses are evaluated asymmetrically and in a context-dependent way, conditioned by cognitive biases that move observed behavior away from full rationality (Kahneman and Tversky 1979). This evidence underpinned the consolidation of behavioral finance as an analytical field devoted to recurrent deviations from classical economic models (Barberis and Thaler 2003), in which biases such as loss aversion, herding, anchoring, overconfidence, and mental accounting occupy a central position.

Among these biases, mental accounting, formalized by Thaler (1985, 1999), describes the tendency of individuals to categorize financial resources into distinct mental accounts defined by subjective criteria such as income source and spending purpose, with direct effects on consumption, saving, and investment. In economic terms the phenomenon is a violation of the fungibility of money, whereby a

monetary unit ceases to be a perfect substitute for another once the two are assigned to different accounts, and the marginal propensity to consume comes to respond to the label attached to the resource as well as to its amount (Thaler 1999). Classic experiments showed that the form of categorization alters choices in systematically predictable ways (Kahneman and Tversky 1981), and subsequent allocation is conditioned by the level of financial knowledge and by perceptions of income, wealth, and future security (Shefrin and Thaler 1988).

The mechanism works in two directions, as a self-control device through which consumers monitor expenses and regulate consumption patterns (Heath and Soll 1996; Cheema and Soman 2006), or as a driver of additional spending when money is treated differently according to its origin (Hamid 2025). The net effect on financial behavior is therefore contingent on context and individual profile (Gupta et al. 2025).

Prospect theory separates choice into an editing phase, in which outcomes are coded, combined, and segregated relative to a reference point, and an evaluation phase, in which the edited prospects receive weights and values (Kahneman and Tversky 1979). Mental accounting operates in the editing phase, and therefore prior to the evaluation of choices, since it decides which outcomes enter the same account together and which reference point the evaluation phase will then use (Thaler 1999). Evidence on the aggregation and segregation of choices converges on the same ordering, indicating that the way decisions are bracketed systematically influences behavior independently of the alternatives themselves (Read et al. 1999).

Financial education consists of the competencies required to interpret and apply economic information to the intertemporal allocation of resources (Lusardi and Mitchell 2014). The definition of the OECD International Network on Financial Education incorporates awareness, knowledge, skills, attitudes, and behaviors oriented toward consistent financial decision-making and individual financial well-being (OECD INFE 2016). Mastery of these competencies conditions budgeting, saving, investment, and risk-management choices (Agarwal et al. 2025; Mitra and De 2025), and financial self-efficacy appears as a relevant mediator between knowledge and behavior (Radianto et al. 2025).

Agarwal et al. (2025) analyzed how financial literacy shapes the relationship between behavioral biases and the investment decisions of Indian retail investors, Mitra and De (2025) investigated how financial education and behavioral biases condition access to financial products, Gupta et al. (2025) model financial education as a moderator of the relationship between behavioral biases and investment decisions, Singh and Nandan (2024b) investigate it as a mediating mechanism in a serial mediation model, and Radianto et al. (2025) treat mental accounting as an explanatory variable of financial behavior. Each configuration implies a distinct causal claim and recommends a different intervention, and the relative distribution of these configurations across the literature remains unknown.

The different forms of operationalization lead studies to answer distinct causal questions, producing equally distinct interpretations and practical implications (Hayes 2018; Igartua and Hayes 2021). Treating mental accounting as a mediator amounts to claiming that financial education changes

behavior because it first alters how resources are categorized, whereas treating it as a moderator amounts to claiming that the same teaching yields more for people who organize their accounts in one way than for those who organize them in another, and the two readings recommend intervening at different points. The contribution attempted here is to apply the antecedent–outcome–mediator–moderator taxonomy as a coding scheme across a body of literature, so that the distribution of causal claims in a field becomes itself an object of measurement. In fields marked by high conceptual and methodological heterogeneity, the absence of a systematic mapping of these approaches hinders comparison and integration of available results (Munn et al. 2018) and allows findings produced under distinct configurations to be juxtaposed as if they were commensurable, weakening evidence accumulation and policy translation.

Despite the growing volume of studies, the intersection of the two constructs still carries open gaps, which the included studies themselves delimit. Gupta et al. (2025) point to scarce evidence on the mediating role of mental accounting in the relationship between personality traits and financial planning, and Radianto et al. (2025) record the low frequency of work jointly analyzing mental accounting, financial attitudes, and financial confidence. Agarwal et al. (2025) observe that most of the literature examines biases in isolation, limiting understanding of how different distortions interact to shape financial behavior. The literature also concentrates on Asian economies, with underrepresentation of Latin American and African contexts (Singh and Nandan 2024b).

This review holds, as a hypothesis to be tested through experimental designs and mediation models, that the logical priority of mental accounting conditions the marginal effectiveness of financial education. Evidence from gambling disorder illustrates the filtering role of mental accounts, since financial literacy remains intact alongside economically harmful behavior, and mental accounting mediates the relationship between education and gambling severity (Hamurcu et al. 2025). The hypothesis is consistent with meta-analytic evidence that standalone educational interventions explain a small share of the variance in financial behaviors (Fernandes et al. 2014), although the causal relationship between mental-account structure and educational returns remains insufficiently investigated.

This study aimed to map the analytical configurations through which Scopus-indexed research links mental accounting and financial education between 2015 and 2025, by means of a scoping review, in order to estimate how often the pathway running from financial education through mental-account structure to observed behavior is actually tested. The extent and provenance of that research are treated as conditions on the reach of the map.

2 Methods

2.1 Design and protocol

The scoping review followed the framework of Arksey and O'Malley (2005) with the refinements of Levac et al. (2010) and the guidance of the Joanna Briggs Institute (Peters et al. 2020), reported in line with the PRISMA-ScR guidelines of Tricco et al. (2018). The Population–Concept–Context structure replaces the PICOS question of intervention reviews, since the extracted unit is the position of the construct within each primary study model (Peters et al. 2020). The population consists of peer-reviewed journal articles, which form the unit of analysis; the concept corresponds to the functional role that each study assigns to mental accounting and to financial education within its analytical model, and the context comprises the Scopus-indexed literature of the period, with no restriction on country, language, or population studied.

Three research questions guided the charting. Q1: Which functional roles does each construct occupy across research designs, and how do those roles combine into analytical configurations? Q2: How often is the complete pathway, with financial education as the antecedent and mental accounting as the intermediate mechanism, actually tested or left assumed? Q3: What does the provenance of the evidence, in time, place, and design, allow the resulting map to support? The completed PRISMA-ScR checklist is provided in Section S1 of the Supplementary Material.

For the synthesis, the Theory–Context–Characteristics–Methods framework, proposed by Paul and Rosado-Serrano (2019), organizes the field along four dimensions of maturity.

The review protocol was registered in the Open Science Framework and is available at https://doi.org/10.17605/OSF.IO/NCPFX.

2.2 Eligibility criteria

Peer-reviewed journal articles indexed in Scopus and published between 2015 and 2025 were included when they contained the terms "mental accounting" and "financial education" in the title, abstract, or keywords. No language restriction was applied, and no restriction was placed on the subject area, the population studied, or the country of origin. Only articles with final publication status were considered. Conference papers, books, book chapters, editorials, notes, and duplicate articles were excluded. The window opening in 2015 was chosen to capture the decade following the consolidation of financial education as a policy agenda, and it returned no eligible record for that first year.

2.3 Information source and search strategy

The search was run in Scopus on 2 September 2025 using the following string: *TITLE-ABS-KEY("mental accounting" AND "financial education") AND DOCTYPE(ar) AND PUBYEAR > 2014 AND PUBYEAR < 2026.*

2.4 Selection of sources of evidence

The 140 records returned were exported to the Mendeley reference manager and tabulated in Microsoft Excel for charting. Screening proceeded in two passes, reading titles and abstracts against the eligibility criteria and then retrieving full texts, with the eligibility decision confirmed at that second reading.

One pair of records was identified as the same publication indexed twice under slightly different metadata, as documented in Section S10 of the Supplementary Material, and one of them was removed. No further record was excluded at either pass, and the flow therefore reports 140 identified, 1 duplicate removed, and 139 included (Fig. 1). The restrictiveness of the query transferred most of the eligibility criteria to the retrieval stage, since Scopus combined the document-type and publication-year filters with the requirement of both expressions in the indexed fields.

2.5 Data charting process and data items

Publication year, country of origin, and continent were extracted from each included article, fields that enter the synthesis as scope conditions of the evidence. Geographic attribution followed a one-country-per-article rule, corresponding to the first author's affiliation or, where the study declared a territorial scope of its own, to the country investigated, with dedicated categories for multinational or global studies and for records without an identifiable country.

A functional coding protocol classified the role of mental accounting and financial education across research designs, through reading of title, abstract, and full text, with title-based classification serving only as initial screening.

The OECD framework separates education, understood as the process of building competencies, from literacy, understood as the level of competence attained (OECD INFE 2016). Both were charted under a single category because the primary studies use the two terms with limited consistency, frequently measuring literacy while naming the construct education. The review pursues the position of the construct in its model.

The distinction between antecedent, outcome, mediator, and moderator is the standard taxonomy of mediation and moderation analysis (Hayes 2018), and its use as a reading grid over a body of literature is established in the review tradition that organizes findings by antecedents, mechanisms, and outcomes (Paul and Benito 2018; Jaiswal et al. 2026). Under that grid, the coding distinguished operationalization of the construct as an independent variable (IV), dependent variable (DV), mediator (MED), moderator (MOD), or solely as a theoretical reference (TR). The non-determined category (ND) was reserved for cases in which the analytical model did not allow a secure assignment, and the same typology was applied to the role of financial education. Designs were categorized as experimental or quasi-experimental studies, cross-sectional surveys, econometric modeling or simulations, and literature reviews. The complete coding is reported in Table S7 of the Supplementary Material, and the labels passed through automatic normalization against the declared taxonomy and a check of the published abstracts, with divergences corrected and recorded in Section S10.

The evidence map of the substantive layer cross-tabulates the role assigned to mental accounting against the role assigned to financial education in a 6 × 6 matrix whose occupied and empty cells locate what the field has modeled and what it has left unmodeled. Collapsing that matrix by whether each construct receives an analytical position produces a typology of four configurations, which were then

interrogated against the claims the articles make in their own titles and abstracts. The supporting layer summarizes the sources numerically, with absolute frequencies and percentages for year, country, continent, design, and population, reported as scope conditions (Arksey and O'Malley 2005; Levac et al. 2010). Role distributions were compared across publication periods and across designs to detect change over time.

2.6 Statistical analysis

The association between the roles assigned to the two constructs was tested through a chi-square test of independence on the 6 × 6 matrix (Table 2). Because 80% of the cells have expected frequencies below five, the p-value was obtained through Monte Carlo simulation with 20,000 replicates and a fixed seed, and the strength of the association was reported through Cramér's V.

The operationalization asymmetry between the constructs and its dependence on study design and publication period were tested through three 2 × 2 collapses analyzed with Fisher's exact test, with the effect expressed as an odds ratio and a 95% confidence interval, oriented uniformly toward the odds of the construct receiving an analytical position.

Mosaic or Pearson-residual displays were set aside because the same sparsity concentrates the largest residuals on cells holding one or two articles. Neither mediation nor moderation was estimated, since the unit of analysis is the article and no outcome is extracted from the primary studies, leaving no effect to decompose (Peters et al. 2020). Computations were run in R 4.5.1, and the routine that reproduces them accompanies the project files.

3 Results and discussion

The evidence base comprises 139 Scopus-indexed articles, after removal of one duplicate.

3.1 Evidence map of analytical configurations

Four configurations exhaust the corpus once the articles are sorted by how the two constructs are positioned relative to each other (Table 1). The dominant configuration, holding half the literature, gives financial education an analytical position and leaves mental accounting in the framing. Both constructs enter the same model in fewer than one article in five, the only situation in which the intersection named in the titles is actually specified. Configuration II carries the policy origin of the field, which treats financial education as a measurable program deliverable (Lusardi and Mitchell 2014; OECD INFE 2016), while mental accounting enters mostly as theoretical justification (Thaler 1999).

Table 1
Typology of analytical configurations in the corpus (n = 139)

Configuration	What the model does	Articles	%
I. Shared vocabulary, no model	Neither construct receives a determinable position	28	20.1
II. Education measured, accounting as backdrop	Financial education is positioned; mental accounting is invoked without being measured	71	51.1
III. Accounting measured, education as backdrop	Mental accounting is positioned; financial education is invoked without being measured	14	10.1
IV. Joint specification	Both constructs receive a position in the same model	26	18.7

Financial education appears, within configuration II, as outcome in 45 articles, as moderator in 15, as antecedent in 7, and as mediator in 4, so that the construct is explained more often than it explains. Within configuration IV, the 26 articles that specify both constructs concentrate on a single cell, with 14 treating both as outcomes of a third set of predictors, and only 2 estimate the pathway that runs from financial knowledge through mental-account structure to behavior. The internal composition is therefore as informative as the size of each configuration, and the predominance of the outcome reflects the logic of program evaluation, which measures attained competency before interrogating the path between knowledge and behavior, whose modest effect on choices meta-analysis already documents (Fernandes et al. 2014). The full cross-tabulation behind the typology is presented in Table 2.

Table 2
Contingency matrix of the functional roles assigned to mental accounting (MA) and financial education (FE) across the 139 included articles

MA role	FE as IV	FE as DV	FE as MED	FE as MOD	FE as TR	FE as ND	Total	%
IV	1	0	1	1	0	0	3	2.2
DV	2	14	2	3	0	12	33	23.7
MED	2	0	0	0	0	2	4	2.9
MOD	0	0	0	0	0	0	0	0.0
TR	2	3	0	2	1	3	11	7.9
ND	5	42	4	13	1	23	88	63.3
Total	**12**	**59**	**7**	**19**	**2**	**40**	**139**	**100.0**
%	8.6	42.4	5.0	13.7	1.4	28.8	100.0	

Note: IV independent variable, DV dependent variable, MED mediator, MOD moderator, TR theoretical reference, ND non-determined. Article-by-article coding is reported in Table S7 of the Supplementary Material.

The map reaches 21 of the 36 possible cells, with a steep distribution across them. Forty-two articles (30.2%) concentrate in a single cell, measuring financial education as an outcome and leaving mental accounting outside the model, and the second most frequent cell, with 23 articles (16.5%), assigns a determinable role to neither construct. Those two cells alone account for 46.8% of the literature. The 15 empty cells are equally informative, since they include every combination in which mental accounting moderates a relationship involving financial education, a specification that has been discussed since the mental-budgeting experiments (Heath and Soll 1996; Cheema and Soman 2006) and that the field still has not estimated, leaving the corpus exposed to the juxtaposition of non-equivalent evidence that scoping reviews flag (Munn et al. 2018).

In the mediating position, mental accounting appears in 4 cases (2.9%), corresponding to the studies of Kumar et al. (2024), Radianto et al. (2024), Gupta and Mohammad (2025), and Mitra and De (2025). The complete pathway running from financial knowledge through mental-account structure to observed behavior is tested in two of them, operating on the financial behavior of 314 Indonesian micro-business owners (Radianto et al. 2024) and on access to financial products among 605 respondents (Mitra and De 2025), while in the remaining two the mediating position coexists with risk perception among 1,133 investors (Kumar et al. 2024) and personality traits among 649 Indian service-sector employees (Gupta and Mohammad 2025) without financial education entering the model. This scarcity of complete pathways is the gap that gives this review its title. Its relevance lies in the kind of question the field can currently answer, since the literature describes financial education and, at most, correlates it with behavior, but rarely demonstrates the path through which it operates, so that educational policy rests on an untested assumption.

Across the corpus, mental accounting remains without a determinable role in 88 articles (63.3%) and appears only as a theoretical reference in a further 11 (7.9%), so that 99 studies (71.2%) mobilize it as conceptual background. Financial education receives more explicit analytical treatment, appearing as an outcome in 59 articles (42.4%), as a moderator in 19 (13.7%), as an independent variable in 12 (8.6%), and as a mediator in 7 (5.0%). The difference between the two distributions suggests that financial education functions as an operationalizable construct in current practice, while mental accounting is invoked as theoretical justification far more often than it is actually measured. The asymmetry is the sharpest difference in the matrix and withstands testing. Mental accounting is operationalized in 40 of the 139 articles against 97 for financial education, and financial education carries 5.7 times the odds of receiving an analytical position (95% CI 3.3 to 9.9; $p < 0.001$, Fisher's exact test), a difference the distribution of roles makes visible (Fig. 2a). The roles assigned to the two constructs, by contrast, show no association with each other ($\chi^2 = 31.8$; $p = 0.102$ by Monte Carlo simulation; Cramér's $V = 0.24$), a result consistent with the reading of shared vocabulary without joint specification.

Measuring these constructs requires reliable scores, reported as omega coefficients with their confidence intervals (Revelle and Zinbarg 2009; Watkins 2017; Flora 2020), and mental accounting has a dedicated instrument in economic psychology (Muehlbacher and Kirchler 2019), which the applied financial-education designs of the corpus almost never use. The asymmetry therefore indicates an

instrumentation gap, since the measurement technology exists and remains idle, so that applied research can correct it by adopting the available instrument.

3.2 Announced mediation and estimated mediation

Eight of the 139 articles (5.8%) explicitly mention mediation, indirect effects, or equivalent formulations in the title (Table 3), a small share of the sample. This percentage does not match the final frequency of mediation models, since titles may omit the analytical strategy adopted in the full text.

Table 3
Articles whose title announces mediation, indirect effects, or equivalent formulations

No. in sample	Year	Country	Formulation observable in the title
11	2025	India	Mediating role of investment decisions
39	2024	India	Indirect effects of financial literacy and impulsivity
62	2024	Indonesia	Mediating role of pro-growth mental accounting
64	2024	India	Mediating effects between risk perception and perceived performance
69	2023	Pakistan	Mediating role of financial literacy
79	2023	India	Herding and overconfidence as mediators
114	2021	Pakistan	Mediating role of risk perception, with financial literacy as moderator
140	2016	Spain	Moderated mediation analysis

The numbering follows the order of Table S6 and is independent of the seven articles in which functional coding assigned a mediating role to financial education. The formulation of article 114 was corrected after checking the original text, in which risk perception operates as the mediator and financial literacy as the moderator.

Financial education, coded against the same scheme, occupies the mediating position in two of the eight studies flagged in Table 3, the antecedent position in one, the outcome position in two, the moderating position in one, and remains undetermined in the two others. Mental accounting occupies the mediating position in two. Eight studies that announce mediation in the title therefore distribute the same construct across five different positions.

The dispersion of positions reflects the dispute over the direction of the relation between literacy and bias, visible in Agarwal et al. (2025), who, with Indian retail investors, find significant mediating effects of behavioral biases on the relationship between financial literacy and investment decisions. The mediation was partial, with negative effects along the mediated paths, indicating that higher financial literacy is associated with the reduction of these biases and, indirectly, with improved decision quality. Jain et al.

(2023), also in India, found significant serial mediation of herding and overconfidence between financial literacy and investment decisions in a sample of 436 investors.

Iram et al. (2023) invert the conduit while keeping the endpoints, placing financial literacy as the mechanism between heuristic biases and the investment decisions of 501 women entrepreneurs. Under the first reading, in which literacy precedes bias, teaching reduces bias; under the second, in which bias precedes literacy, bias governs how much teaching is absorbed, and the two readings place the point of intervention at opposite ends. Iram et al. (2024) extend the inversion within the same research line, placing mental accounting among the prospect factors that precede financial literacy in 579 women entrepreneurs, so that the categorization of resources becomes an antecedent of competency.

Direct confrontation between the two readings remains rare in the sample because all eight studies are cross-sectional surveys, and contemporaneous measurement of literacy and bias is compatible with either ordering, since indirect effects estimated from cross-sectional data do not establish temporal precedence (Hayes 2018; Igartua and Hayes 2021). The disagreement is sustained by a design limitation that the field has not treated as such, and it persists in precisely the segment of the literature that uses mediation language most confidently.

Singh and Nandan (2024b), corresponding to article 39 in Table 3, provide the evidence most directly relevant to this review, since mental accounting there constitutes the outcome of the model. Indirect effects of time orientation on mental accounting were significant through impulsivity and financial literacy. The coefficients were $\beta = 0.161$ and $\beta = -0.126$ via impulsivity, $\beta = 0.087$ via financial literacy, and $\beta = 0.034$ and $\beta = 0.066$ for the serial effects, indicating distinct directions depending on the pathway analyzed. In the Spanish study by Topa and Herrador-Alcaide (2016), moderated mediation analysis identified a significant indirect effect of retirement financial goals on saving and investment behavior ($b = 0.13$; 95% CI 0.06–0.21), with the direct effect also retained, characterizing partial mediation.

Mental accounting reaches the intermediate position in two of the eight studies, and the two cases differ in how much of the construct is actually carried into that position. Radianto et al. (2024) place a pro-growth mental accounting mindset as the explicit mediator between financial knowledge and the financial behavior of 314 Indonesian micro-business owners, at a magnitude exceeding that of financial self-efficacy in the same structural equation model. Kumar et al. (2024) reach the mediating position by a different route, assigning it to a block of heuristic and prospect-theory-consistent biases among 1,133 investors, within which the categorization of resources is one component among several and is not estimated separately.

This contrast between Radianto et al. (2024) and Kumar et al. (2024) isolates what the field lacks. Radianto et al. (2024) estimate a coefficient for mental accounting because they adopt a dedicated measurement instrument, whereas Kumar et al. (2024) absorb the construct into a composite because no such instrument was adopted. That disparity in measurement, more than any disagreement about theory, is what keeps the pathway untested.

Mediation language circulates widely, the intermediate position is contested between literacy and bias without the designs being able to settle the ordering, and mental accounting reaches that position in two cases, only one of which estimates it as a construct in its own right, so that what the field names and what it estimates diverge, tracking the availability of measurement.

3.3 Temporal change in positioning

Studies that measure the construct account for 4 of the 25 articles published between 2016 and 2020 (16.0%) and for 37 of the 114 published between 2021 and 2025 (32.5%). The share of work that treats mental accounting as something to be measured therefore roughly doubled while the field expanded fivefold. The 2021 to 2025 period carries 2.5 times the odds of the earlier one, with an interval that includes parity (95% CI 0.8 to 10.8; p = 0.146), so the reading remains one of tendency. The movement is clearer for mechanistic designs. No article published up to 2020 placed either construct in a mediating position, against 11 of the 114 published from 2021 onward (9.6%). Mediation modeling is therefore a recent arrival in this intersection, which tempers reading the gap as stagnation and points to an agenda still in formation. The analytical repertoire applied to financial education widened at the same break. The 25 articles published up to 2020 place the construct as a measured outcome in 14 cases, as a moderator in 1, and without a determinable role in the remaining 10, whereas from 2021 onward all six positions are occupied, including 12 articles that treat it as the antecedent and 7 that place it in the mediating position.

The 2021 turning point coincides with the year in which annual output begins to climb steeply, rising from 12 articles in 2021 to 34 in 2024, and the same point in time divides a descriptive phase from an analytically more ambitious one. The growth may reflect the expansion of indexed outlets in emerging markets over the same period, and the charted data cannot separate that artifact of coverage from a substantive shift, a distinction that governs how much weight the recent literature deserves.

Cross-sectional surveys measure mental accounting in 36 of 102 studies (35.3%), while experimental and quasi-experimental designs do so in 3 of 20 (15.0%), although manipulating the framing of resources is what an experiment can do and a survey cannot. Cross-sectional surveys carry 3.1 times the odds of experimental designs of measuring the construct, with an interval that includes parity (95% CI 0.8 to 17.4; p = 0.114) and with the critical cell holding only 3 cases, so the difference is not distinguishable from chance at this sample size (Fig. 2b). Financial education, by contrast, is operationalized at similar rates in both (75.5% and 75.0%).

3.4 Scope conditions of the evidence base

With 82.0% of the corpus published between 2021 and 2025 and a compound annual growth rate of 43.6% between 2020 and 2024, output is recent, so that the provenance of the evidence bounds the map to a literature still in formation. The annual series and the full distribution by country are given in Sections S4, S5, and S11 of the Supplementary Material.

Output concentrates in Asia, which accounts for 79 articles (56.8%) (Table S5, Supplementary Material). India leads with 30 publications (21.6%), followed by the United States and Pakistan (n = 12 each; 8.6%), China (n = 9; 6.5%), and Indonesia (n = 7; 5.0%), so that these five countries account for half of the mapped articles. Interest in the topic in the Indian context may be associated with the accelerated growth in the number of retail investors in that country, combined with the recognition that financial literacy alone appears insufficient to explain individual decisions (Agarwal et al. 2025; Gupta et al. 2025).

Outside Asia, Europe contributes 29 articles (20.9%) in second position (Fig. 3) and North America 12 (8.6%), concentrated in the United States. Africa (n = 5; 3.6%) and South America (n = 4; 2.9%) show limited participation, while no article was assigned exclusively to Oceania, seven studies (5.0%) are multi-country or global in scope, and three (2.2%) do not report the country of origin. The low representation of Latin American and African countries is consistent with patterns observed in other applied social science fields (Singh and Nandan 2024b).

Cross-sectional surveys account for 102 of the 139 studies (73.4%), followed by 20 experimental or quasi-experimental designs (14.4%), 5 literature reviews (3.6%), and 2 econometric models or simulations (1.4%), with 10 articles (7.2%) whose design could not be determined, a predominance that explains in part the operationalization asymmetry. Retail or institutional investors make up the population of 58 studies (41.7%), ahead of general population and consumers (n = 28; 20.1%), university students (n = 20; 14.4%), and entrepreneurs or business owners (n = 7; 5.0%), with a further 21 articles (15.1%) not specifying the population investigated. Sample size was reported in 130 of the 139 articles, with a median of 402 participants and an interquartile range of 222 to 690. Surveys and experiments differ as expected, with medians of 406 and 242, yet the measurement of mental accounting shows no association with study size, since articles that measure the construct report a median of 400 against 410 among those that do not.

3.5 Implications for theory and policy

Juxtaposing the configurations of Table 1 without explicit coding of the functional roles leads the literature to combine non-equivalent evidence, which hampers estimates of the magnitude of the effect of financial education on reducing behavioral biases (Baker et al. 2019; Şenol and Onay 2023) and makes the distinction between those roles a condition for evidence accumulation.

Depending on the role assigned to financial education, the intervention design changes, since programs based on conceptual training may suffice where the construct merely attenuates biases, whereas framing interventions, resource labeling, and reorganization of mental accounts suit specific choices when mental accounting operates as an intermediate mechanism. The scarcity of mediation models documented in Table 2 therefore becomes an applied gap, with consequences for the design of public programs. The distributive stakes are uneven, since households operating with thin margins bear the cost of an intervention aimed at the wrong link in the chain.

These distributive stakes weigh more heavily because the operation of mental accounting is sensitive to cultural norms regarding saving, indebtedness, and intergenerational transfers (Shefrin and Thaler 1988), and the structure of mental accounts documented in Asian populations may not generalize to Latin American or African contexts, where public programs are designed on evidence produced elsewhere under household arrangements the source studies did not observe. The combination of geographic asymmetry and absence of mediation models suggests that forthcoming studies may contribute most by articulating explicit causal designs with samples from still underrepresented contexts.

4 Synthesis along the TCCM dimensions and research agenda

The agenda derives from the dimension that lags in Table 4, which reads the maturity of the intersection along the Theory–Context–Characteristics–Methods framework (Paul and Rosado-Serrano 2019).

Table 4
Maturity of the intersection along the TCCM dimensions (n = 139)

Dimension	Indicator	Value	Reading
Theory	Mental accounting operationalized	40 (28.8%)	The focal construct is invoked far more often than it is measured
Theory	Mental accounting invoked without measurement	99 (71.2%)	
Theory	Operationalization ratio, financial education to mental accounting	2.43	
Context	Articles from Asia	79 (56.8%)	Evidence concentrated in one continent and one population
Context	Five most productive countries	70 (50.4%)	
Context	Retail or institutional investors as the population	58 (41.7%)	
Characteristics	Both constructs operationalized in the same model	26 (18.7%)	The intersection named in the titles is rarely modeled
Characteristics	Modal configuration, education as outcome and accounting absent	42 (30.2%)	
Characteristics	Complete pathway, education antecedent and accounting mediator	2 (1.4%)	
Characteristics	Cells of the 6 × 6 matrix occupied	21 of 36	
Methods	Cross-sectional surveys	102 (73.4%)	Designs capable of establishing temporal order are scarce
Methods	Experimental or quasi-experimental designs	20 (14.4%)	
Methods	Median sample size, reported in 130 articles	402	

The four dimensions fall behind at distinct rates, and Context is the least deficient, since 43.2% of the corpus originates outside Asia and four populations are represented with some balance, so a reader willing to accept cultural portability already has material to work with, whereas Theory is deficient in a specific and measurable way, with the focal construct carried by prose in 71.2% of the articles and by a parameter in 28.8%. Characteristics is the binding constraint, since the intersection that defines the field is modeled in fewer than one article in five, and Methods explains why the constraint binds, because 73.4% of the corpus uses designs that measure antecedent and consequent at the same moment and therefore cannot sustain the ordering that a mediation claim requires.

Adding studies in underrepresented contexts without changing designs would multiply cross-sectional correlations in new places, whereas adding experiments without a measurement instrument for mental accounting would reproduce the substitution observed in the corpus, in which the mediating position migrates to the construct the authors had instrumented. The sequence that follows from Table 4 therefore begins with measurement, proceeds to design, and only then extends to context.

4.1 Research agenda

Four fronts follow from the dimension that lags, chained by the dependence between them, and a single well-specified study can refute each of them along the route from the model the field postulates to what the evidence actually estimates (Fig. 4).

The arrow running through mental accounting assumes that formal instruction changes behavior only after reorganizing the categories into which a person sorts resources (Thaler 1999), whereas the arrow bypassing it assumes that part of the knowledge acts without touching that structure, a reading consistent with the small share of variance that educational interventions explain (Fernandes et al. 2014). The disagreement between the two arrows, which the corpus does not settle, moves the point at which a program should intervene.

Note

POSTULATED gives the pathway the field names; CONFIGURATIONS distributes the 139 articles across the four configurations of Table 1; GAP quantifies the mediation actually estimated; CONSTRAINT summarizes the lagging dimensions of Table 4; AGENDA orders the fronts by the dependence between them. Color and hatching encode the same information, in the Okabe-Ito palette, with blue marking where the corpus accumulates and orange where it is scarce or absent. FE = financial education; MA = mental accounting; IV = independent variable; DV = dependent variable; MED = mediator; MOD = moderator; ND = non-determined; CI = confidence interval; c' = direct effect.

The dominant configuration measures financial education as an outcome and leaves mental accounting outside the model, asking whether knowledge increased without checking whether it reached the decision, and a higher literacy score is therefore compatible with unchanged behavior.

The gap lies in what the studies model rather than in how many of them there are, since among the studies that announce mediation the intermediate position migrates with the instrument at hand, occupied by behavioral biases (Agarwal et al. 2025), by financial literacy itself (Iram et al. 2023, 2024), by the investment decision (Sharma et al. 2025) or by risk perception (Wangzhou et al. 2021).

No study in the corpus has checked whether individuals whose account structure is rigid draw less from the same educational intervention than those whose structure is flexible, and the corresponding cell of Table 2 remains empty. The answer would indicate for whom financial education works, and the absence of that answer leaves the targeting of programs without empirical support.

Without an estimated parameter, the claim that mental accounting explains a behavior cannot be refuted. Deliberately varying the framing of a resource, presenting the same amount now as salary and now as a windfall, is an operation only the experiment performs.

Existing programs are still designed without deciding between teaching concepts and reorganizing mental accounts.

A validated and parsimonious measure of mental-account structure, applicable outside the laboratory, conditions everything that follows. The disparity of 2.43 to 1 in operationalization between the two constructs resists the obvious explanations of sample size and recency, and the contrast between Radianto et al. (2024), who estimate a coefficient because they adopt a dedicated instrument, and Kumar et al. (2024), who absorb the construct into a composite, isolates measurement as the operative difference.

Once the mediator is measured, the pathway running from financial education through mental-account structure to observed behavior tends to show partial mediation, with the indirect effect coexisting with a direct effect of the antecedent, the most common outcome when the proposed mechanism is one among several (Zhao et al. 2010). Testing it depends on an instrument dedicated to the mediator, because measurement error in that position attenuates the estimated indirect effect and can suppress a mechanism that exists (Fritz et al. 2016). The single article in the corpus that estimates the complete pathway reports the mediator exceeding financial self-efficacy in magnitude, with the direct effect retained (Radianto et al. 2024), indicating a transmission that is substantial without being exclusive. A study designed to refute this expectation would specify both endpoints and report the indirect effect with its confidence interval.

With the baseline fixed by the estimated mediated pathway, experimental manipulation of account labeling tends to move behavior more than equivalent instruction about the same resources. The corpus supports the premise only indirectly, since the experimental tradition measured mental accounting in 3 of 20 cases against 36 of 102 among surveys, so the tradition best equipped to manipulate framing has largely declined to do so. The experimental evidence on earmarking and partitioning among low-income households (Soman and Cheema 2011) indicates the effect is obtainable, and a factorial design crossing labeling against instruction would settle the comparison.

The regularity of income shapes the content of mental accounts while leaving the magnitude of their effect broadly intact, an expectation testable across contexts only after the three preceding fronts. The behavioral life-cycle hypothesis already defines accounts by the origin of the resource, assigning distinct marginal propensities to consume according to the account it enters (Shefrin and Thaler 1988), and research on household budgeting shows that the boundaries between accounts track the purpose and the expected timing of inflows (Zhang and Sussman 2018). Morduch and Siwicki (2017) follow US households month by month and record that the instability of income, and not its level alone, organizes household money management, so that evidence produced in markets with formalized earnings may not describe households whose income arrives irregularly, where the expected date of arrival plausibly

prevails as the organizing criterion of the accounts. The expectation is refutable by replication in a context with high informality, and the 43.2% of the corpus produced outside Asia provides comparison material that the 2.9% from South America does not yet supply.

A field that addressed these four fronts in the order in which they depend on one another would convert an intersection currently defined by vocabulary into one defined by estimated parameters, a passage that requires construct definitions precise enough to sustain measurement (Podsakoff et al. 2016) and that is the declared purpose of an agenda derived from a domain-based review (Paul and Rosado-Serrano 2019).

5 Future work

Extending retrieval to Web of Science, SciELO, and grey literature widens the chance of reaching Latin American and African studies published in regional journals and allows a test of whether the geographic asymmetry described here is a property of the field or of the database consulted. Relaxing the requirement that both terms appear in title, abstract, or keywords would further reach studies that mobilize mental accounting without naming it in those fields.

Among the possible follow-ups, systematic verification of the functional coding would most alter the figures reported here, since auditing the published abstracts of the four articles coding mental accounting as a mediator corrected two assignments of the financial education role and raised from zero to two the number of studies testing the complete pathway, so the corresponding cell is a lower bound. A second round of independent coding across the whole matrix, with a formal estimate of intercoder agreement, would turn that targeted correction into a measure of the reliability of the typology.

Separating financial education from financial literacy into two distinct categories is the extension with the greatest consequence for intervention design, because a program that builds competencies and a measure of competence attained are different objects (OECD INFE 2016). A review built on that separation needs to chart the measurement instrument of each study rather than the declared construct alone, a more demanding exercise that returns a map readable as a policy input.

A subsequent systematic review, with critical appraisal of the sources and extraction of reported outcomes, would allow the move from a map of configurations to a quantitative synthesis of the indirect effect, and weighting by study quality would give access to the evidential strength that the present map does not measure (Peters et al. 2020). Assigning more than one country per article, in place of the single country adopted here so that the geographic distribution would close at 139 records, opens in parallel the analysis of international collaboration networks that counting by record keeps invisible.

6 Conclusion

Four configurations exhaust the corpus, with joint specification of both constructs confined to a minority of designs and financial education measured across a dominant share of the literature, so that the

intersection is shared as vocabulary more than as a model. Functional coding of the included articles shows that mental accounting is mobilized primarily as background theoretical reference, while the position of intermediate mechanism falls, when tested, on financial literacy, risk perception, or correlated biases. The configuration running from financial education through mental-account structure to observed behavior appears in a small fraction of the sample examined, restricted to Asian contexts. Policies that treat financial education as a lever on household well-being therefore rest on a causal chain that the literature has assumed far more often than it has measured. The trajectory is nonetheless upward, since the measurement of mental accounting doubled between the two halves of the decade and mediation designs entered the field only after 2020. Along the TCCM dimensions, measurement is the binding constraint. The agenda derived here therefore begins with a validated measure of mental-account structure, proceeds to designs capable of sustaining temporal order, and only then extends to the contexts that remain underrepresented.

Declarations

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Conflict of interest.

The authors declare no competing interests.

Ethics approval.

Not applicable. The study analyzed previously published literature and involved no human participants or animals.

Consent to participate.

Not applicable.

Consent for publication.

Not applicable.

Data availability.

The list of included articles, the continental and country distributions, and the complete functional coding of the 139 articles are available in the Supplementary Material. The review protocol is registered at https://doi.org/10.17605/OSF.IO/NCPFX.

Code availability.

The R routine that reproduces the statistical tests accompanies the project files.

Author contributions.

Iana Lima Da Silva Moraes: conceptualization, methodology, investigation, data curation, formal analysis, visualization, writing - original draft. Ione Aparecida Silva da Cruz: methodology, validation, writing - review and editing, supervision. Luiz Diego Vidal Santos: conceptualization, methodology, formal analysis, writing - review and editing, supervision, project administration. Tânia Cristina Azevedo: methodology, validation, supervision, writing - review and editing. All authors read and approved the final version.

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Figures

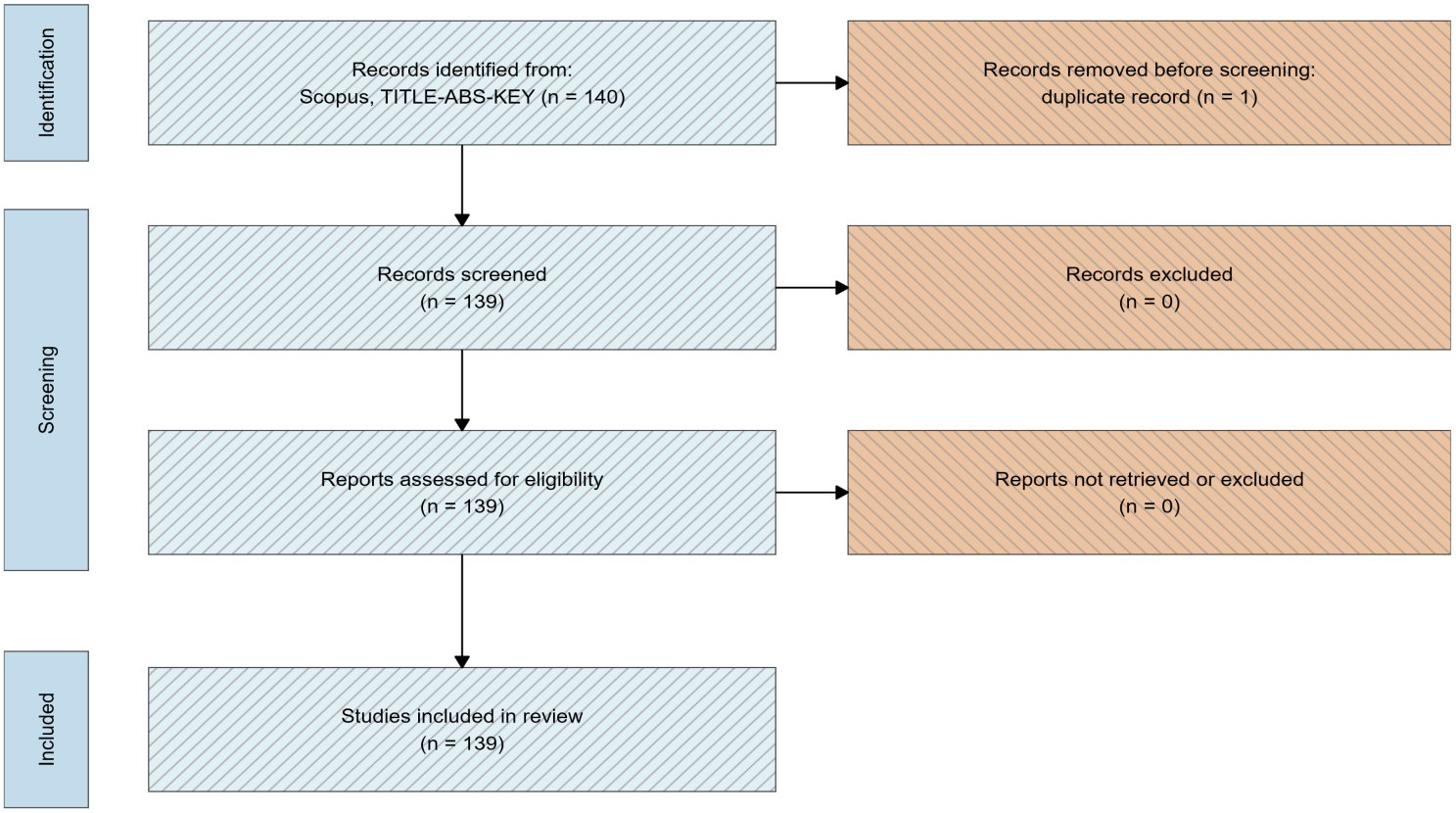


Figure 1

PRISMA-ScR flow diagram of the identification, screening, and inclusion process. Color and hatching follow the convention adopted in the other figures, with blue and right-leaning strokes for the flow that is retained and orange and left-leaning strokes for the records removed. The two channels carry the same information, so the figure stays legible when printed in black and white.

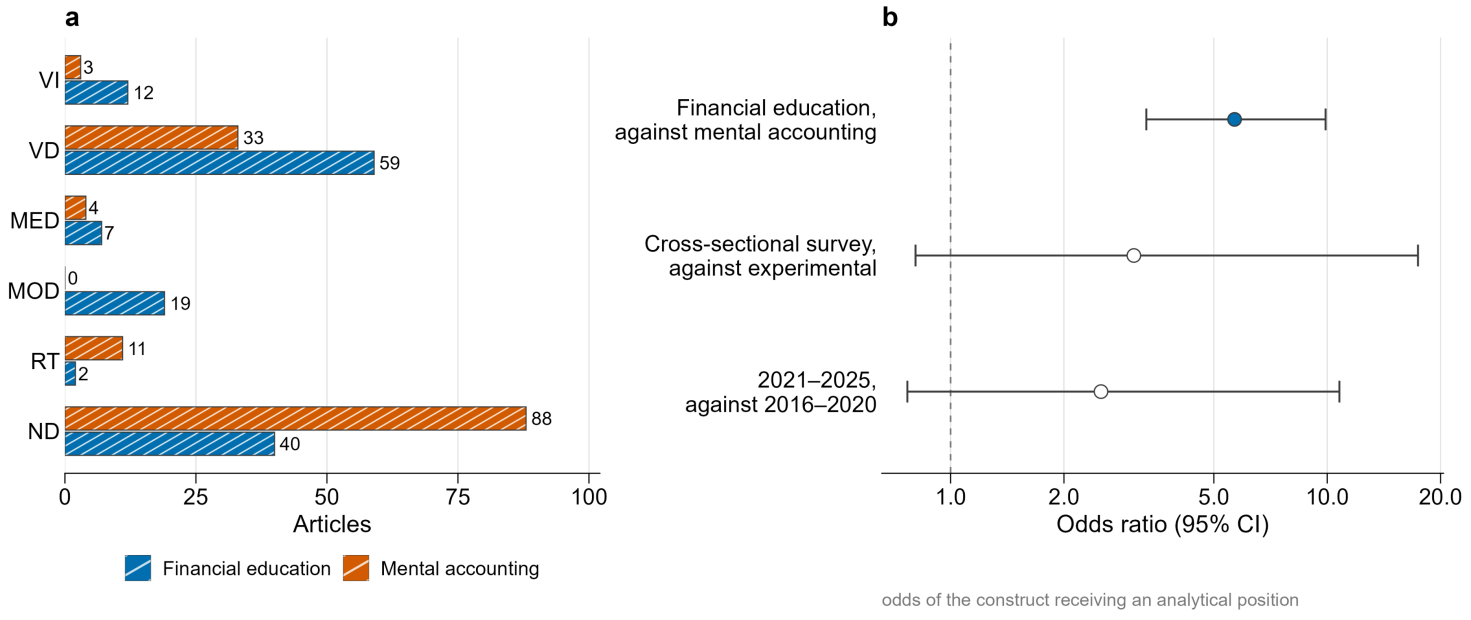


Figure 2

Operationalization of the two constructs and associations tested. **a** Distribution of the functional roles assigned to mental accounting and to financial education across the 139 articles, using the codes of Table 2. **b** Odds ratios with 95% confidence intervals, all oriented toward the odds of the construct receiving an analytical position, on a logarithmic scale, with the dashed line at parity. The filled point marks an interval that excludes unity and the hollow point an interval that includes it. Source: Research data (2025).

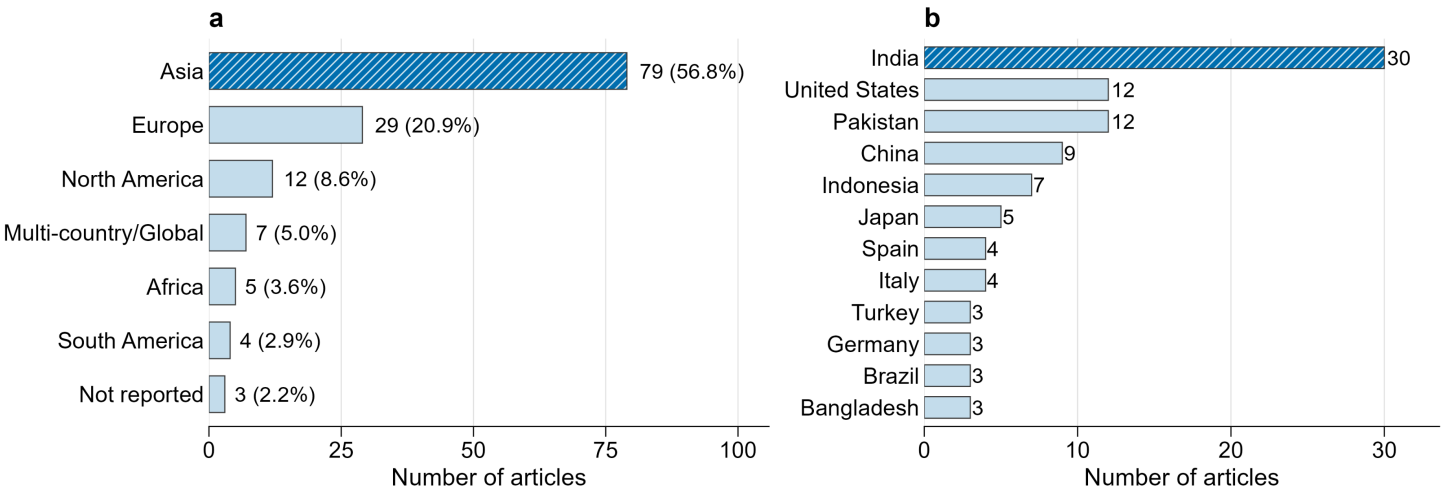


Figure 3

Geographic distribution of the 139 included articles. **a** Share by continent, with Asia standing out. **b** Countries with three or more articles; the solid blue bar with right-leaning hatching marks the leading category in each panel, and the remaining bars take a light tint of the same color without hatching, with India accounting for 30 publications. Source: Research data (2025).

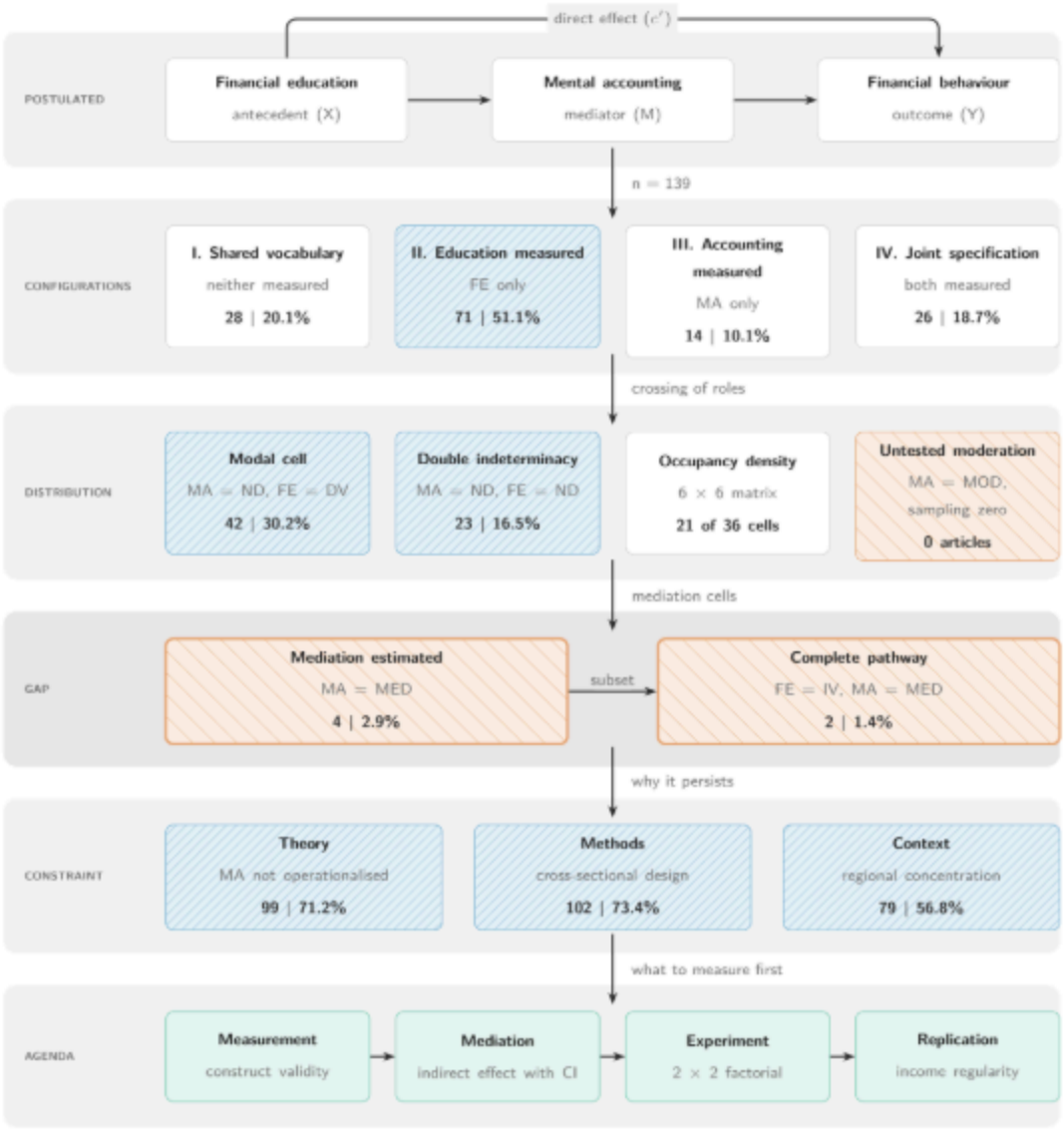


Figure 4

From the postulated model to the derived agenda, in six bands.

Note. POSTULATED gives the pathway the field names; CONFIGURATIONS distributes the 139 articles across the four configurations of Table 1; GAP quantifies the mediation actually estimated; CONSTRAINT summarizes the lagging dimensions of Table 4; AGENDA orders the fronts by the dependence between them. Color and hatching encode the same information, in the Okabe-Ito palette, with blue marking where the corpus accumulates and orange where it is scarce or absent. FE = financial education; MA = mental accounting; IV = independent variable; DV = dependent variable; MED = mediator; MOD = moderator; ND = non-determined; CI = confidence interval; c' = direct effect.