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Financial literacy and retirement preparedness in a developing economy: how conscientiousness and openness condition the payoff to financial knowledge

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Abstract

Purpose. *Financial literacy is widely treated as a lever for improving retirement outcomes, yet the assumption that knowledge translates evenly into preparation across individuals has rarely been tested in settings where pension coverage is thin. This study examines whether basic and advanced financial literacy predict retirement preparedness among salaried professionals in Pakistan, and whether the five-factor personality traits set boundaries on that relationship.*

Methodology. *Survey data were collected from 302 full-time working professionals in Karachi using an adapted instrument covering financial literacy at two levels, the Big Five traits, and retirement preparedness. The model was estimated with partial least squares structural equation modelling. Ten interaction terms were specified using the product-indicator approach, and significance was assessed with 5,000 bootstrap resamples. Because ten moderating hypotheses were tested simultaneously, results were re-examined after a Benjamini and Hochberg false discovery rate correction.*

Findings. *Both literacy dimensions predicted retirement preparedness, with advanced literacy carrying the larger coefficient (β = 0.170, p = 0.002) and basic literacy the smaller one (β = 0.152, p = 0.040). Together with the interaction terms the model explained 32.1 per cent of the variance in preparedness and returned a Q^2 of 0.142. Only two traits qualified the relationship. Conscientiousness strengthened both literacy paths, and openness strengthened the basic literacy path only. Simple slope analysis showed that among respondents one standard deviation below the mean on conscientiousness, the association between financial literacy and preparedness was flat or slightly negative, while among those one standard deviation above it the slope rose to 0.42. Extraversion, agreeableness and neuroticism produced no reliable interaction. After the multiplicity correction only the openness by basic literacy term survived at a 5 per cent false discovery rate, with the two conscientiousness terms surviving at 10 per cent.*

Research limitations. *The design is cross-sectional and confined to one city, the sample skews young and toward lower-income brackets, and preparedness is self-reported. These features limit causal and national inference.*

Practical implications. *Financial education delivered at the workplace is unlikely to produce uniform gains. Programmes that combine content with implementation supports such as default enrolment, scheduled reviews and automated contributions target precisely the group for whom knowledge alone does not convert into action.*

Value. *The study offers the first test in Pakistan of the Big Five as boundary conditions on the link between financial literacy and retirement preparedness, distinguishes basic from advanced literacy in that test, and reports a multiplicity-adjusted reading of a moderation model, which is uncommon in this literature.*

Keywords: *Financial literacy, Retirement preparedness, Big Five personality traits, Conscientiousness, PLS-SEM, Pakistan*

Paper type: *Research paper*

1. Introduction

Old-age income security in Pakistan rests on a narrow base. Formal pension arrangements reach somewhere between 6 and 10 per cent of people above pension age, against an average close to 20 per cent across developing economies, and the Employees' Old-Age Benefits Institution has fewer than 8 million registered contributors in a labour force above 75 million (Pakistan Institute of Development Economics, 2024). More than nine in ten workers are in the private sector, most of them in informal arrangements that generate no retirement claim at all. At the same time the public pension bill is growing at roughly 25 per cent a year and is projected to consume a rising share of federal and provincial budgets over the coming decades. The arithmetic points in one direction. For most Pakistani households, whatever they will live on after they stop working is whatever they themselves put aside.

That places a heavy burden on individual financial decision-making, and the evidence on how well equipped people are to carry it is not encouraging. The Standard & Poor's Global Financial Literacy Survey placed Pakistan among the least financially literate countries in its sample, with roughly a quarter of adults able to answer basic questions on interest, inflation and risk diversification (Klapper et al., 2015). Account ownership has improved since then, but access to an account is not the same as the capacity to use it well (World Bank, 2025). The gap between having a financial product and knowing what to do with it is exactly where financial literacy research has concentrated for two decades, and it has consequences beyond retirement, since literacy is also associated with a household's ability to absorb an income shock (Klapper and Lusardi, 2020).

The dominant finding in that literature is that financial literacy and retirement planning move together. Studies across the Netherlands, Australia, Canada, China, Malaysia and Brunei report positive associations, often with advanced literacy mattering more than basic literacy (Alessie et al., 2011; Agnew et al., 2013; Boisclair et al., 2014; Niu et al., 2020; Mahdzan et al., 2017; Pg Hj Md Salleh and Baha, 2020). A bibliometric review of the field counted a rapid expansion of this work after 2010 and noted its concentration in high-income settings (Gallego-Losada et al., 2022). Lusardi and Mitchell (2014) summarise the case for treating literacy as a form of human capital that raises the return to planning.

There is a step in that argument that usually goes unexamined. Knowing what compound interest does to a balance is not the same as opening an account, choosing a contribution rate and sustaining it for thirty years. Between knowledge and preparation sits the question of whether a person acts on what they know, and that question is a psychological one. Personality research offers a well-validated map of the relevant dispositions in the five-factor model, and separate strands of work have linked those traits to saving behaviour, financial risk tolerance and investment biases (Brown and Taylor, 2014; Donnelly et al., 2012; Pinjisakikool, 2017a; Shanmugam et al., 2023; Baker et al., 2024). What has not been done, at least in a developing economy with the pension profile described above, is to bring the two literatures together and ask whether personality determines who converts financial knowledge into retirement preparation.

Pakistan is a revealing place to ask it. The country combines the conditions that make individual preparation consequential, namely thin formal coverage, a young workforce and a growing dependency burden, with the conditions that make it difficult, namely low measured literacy, limited product familiarity and a savings culture oriented toward gold, property and informal arrangements rather than long-horizon financial instruments. The statutory retirement age is 60 against a life expectancy in the high sixties, so the period that has to be financed is real but not so long that people treat it as unimaginable. Karachi concentrates the formal salaried employment where voluntary preparation is at least feasible, which makes it the appropriate site for a first test.

This study does that. It tests the direct effect of basic and advanced financial literacy on retirement preparedness among salaried professionals in Karachi, and then asks whether each of the five traits changes the size of that effect. Three questions organise the analysis. Does financial literacy predict retirement preparedness in this setting, and does the effect differ by level of literacy? Do the Big Five traits alter the strength of that relationship? And if they do, which traits, and on which dimension of literacy? Three contributions follow.

First, the study treats personality as a boundary condition rather than as a predictor. Most work that combines traits with financial outcomes models the trait as an independent variable. Framing it as a moderator asks a different and more policy relevant question, namely for whom financial education is likely to work.

Second, the study keeps basic and advanced literacy separate throughout. The two are often collapsed, which obscures the possibility that different traits matter at different levels of knowledge. The results here suggest that they do.

Third, the study reports what a multiplicity correction does to a moderation model. Testing ten interaction terms in a single structural model creates an obvious risk of chance findings, and this risk is rarely acknowledged in applied partial least squares work. Reporting both the conventional and the corrected reading gives readers a more honest picture of which effects are strong enough to build on.

The remainder of the paper sets out the theoretical background and hypotheses, describes the method, presents the measurement and structural results, and discusses what the pattern means for financial education design in a country where the state safety net is thin.

2. Theoretical background and hypotheses

2.1 Financial literacy as human capital for retirement

The life cycle framework treats saving as the smoothing of consumption across a working life and a retirement period (Modigliani and Brumberg, 1954). Households in that framework are assumed to forecast their income path, form a view about longevity, and allocate resources accordingly. Whether real households can perform those operations is an empirical matter, and this is where financial literacy entered the discussion. Lusardi and Mitchell (2014) recast literacy as an investment in human capital that lowers the cost of financial planning. On this reading, a person with a working grasp of interest compounding, inflation and diversification faces a lower effective price for retirement planning than a person without it, and so plans more.

Two features of the framework matter for the present argument. The first is that it assumes a planner. Consumption smoothing across four decades requires someone to form the forecast, act on it and revise it, and the model is silent about the psychological requirements of doing so. The second is that its predictions are sensitive to the cost of planning. If planning is costless, everyone plans and only resources differ. If

planning is costly, the people who plan will be those for whom the cost is lowest, and financial literacy is one of the things that lowers it. Browning and Lusardi (1996) catalogued the range of motives that actually drive household saving, from precaution to bequest to the down payment on a house, and observed that retirement is only one of them and often not the most salient. That observation sets a realistic ceiling on how much any single predictor of retirement preparation should be expected to explain.

Empirical support is broad. Alessie et al. (2011) found Dutch respondents with higher literacy far more likely to have thought about retirement. Van Rooij et al. (2012) linked literacy to both planning and accumulated wealth. Comparable results appear in Australia (Agnew et al., 2013), Canada (Boisclair et al., 2014) and China (Niu et al., 2020). Work in emerging economies has extended the finding while adding mediating mechanisms such as risk tolerance and saving behaviour (Harahap et al., 2022).

The evidence is not uniform, however. Farrar et al. (2018) reported that retirement preparedness was not significantly related to financial literacy once other factors were accounted for, and Niu et al. (2020) found basic literacy to be a weak predictor once advanced literacy was included. Divergent findings of this kind are usually attributed to measurement or to sample composition. An alternative reading is that the relationship is genuinely conditional, and that studies differ because their samples differ in the dispositions that govern follow-through. That reading motivates the design used here.

2.2 Two levels of financial literacy

Lusardi and Mitchell (2011) drew a distinction that has since become standard. Basic financial literacy covers numeracy applied to money, the effect of inflation on purchasing power, and simple interest calculation. Advanced financial literacy covers the working of financial instruments, the difference between bonds and equities, the relationship between interest rates and bond prices, and the logic of diversification. Karaa and Kuğu (2016) argued that the two levels should be modelled separately rather than summed, since they are acquired differently and are likely to bear on different decisions.

The distinction matters for retirement. Deciding to save at all is close to a basic literacy problem. Deciding how to invest what is saved, over a horizon long enough for compounding and inflation to dominate outcomes, is an advanced literacy problem. In a market where voluntary pension products are available but lightly used, the second decision is the one that separates people who accumulate a retirement asset from people who hold cash. Prior work in Pakistan has documented low participation in equity and mutual fund markets alongside a preference for gold, property and deposit accounts (Ali et al., 2011), which is the pattern one would expect where basic literacy outruns advanced literacy.

H1. Basic financial literacy is positively associated with retirement preparedness.

H2. Advanced financial literacy is positively associated with retirement preparedness.

2.3 What retirement preparedness means

Retirement preparedness has been operationalised in at least three ways in this literature, and the choice affects what a study can claim. Some work uses a behavioural indicator, most often whether a respondent has ever tried to work out how much they need to save. Some uses an accumulation measure, such as wealth or a replacement rate. Some uses a psychological measure, such as confidence about post-retirement adequacy. Gutierrez and Hershey (2015) treat preparedness as a process that begins with awareness, moves through planning and ends in provision, which suggests that the three measurement approaches are capturing different stages rather than competing versions of the same thing.

Earl et al. (2015) add a further consideration, showing that financial literacy relates to retirement self-efficacy as well as to judgement, which suggests that a preparedness measure capturing perceived readiness is

picking up something real rather than mere optimism. The present study uses a self-reported measure covering the extent of planning, the provision made and expected adequacy, which sits between the behavioural and psychological versions. This is appropriate for a sample of early-career professionals for whom accumulation measures would be uninformative, since most have had too few working years to have accumulated much regardless of their intentions. It is less appropriate for claims about retirement adequacy, and the paper does not make them. What is being modelled is the degree to which a person has engaged with the problem, not whether they have solved it.

The distinction matters for interpreting the personality results. If preparedness were measured purely as accumulated wealth, a conscientiousness effect might reflect earnings differences rather than planning differences, since conscientiousness predicts occupational attainment. Measuring engagement with planning reduces that confound, though it does not eliminate it.

2.4 Personality as a boundary condition

The five-factor model organises trait variation into openness to experience, conscientiousness, extraversion, agreeableness and neuroticism (McCrae and John, 1992; Costa and McCrae, 1992). The traits are stable in adulthood, show reasonable cross-cultural replication, and have been linked to a range of economic behaviours. Brown and Taylor (2014) found conscientiousness associated with higher saving and lower unsecured debt in British household data. Donnelly et al. (2012) reported similar patterns for financial management practice. Pinjisakikool (2017a, 2017b) linked traits to both financial literacy itself and to risk tolerance. More recent work has examined traits alongside literacy in investment settings, with Baker et al. (2024) reporting that financial literacy conditions the relationship between certain traits and behavioural biases, and Shanmugam et al. (2023) reporting associations between traits, literacy and risk propensity among Indian investors.

A prior question is whether the five-factor structure holds outside the Western samples on which it was developed. The evidence suggests it broadly does. McCrae and Allik (2002) assembled replications across more than thirty cultures and found the five-factor structure recoverable in almost all of them, with trait means varying by culture while the factor structure itself remained stable. This matters here because a moderation hypothesis assumes that the moderator means the same thing across the sample. It does not, however, guarantee that the behavioural consequences of a trait are culturally invariant. Conscientiousness may express itself through different behaviours where extended family obligations, informal savings committees and property based wealth holding are the norm, which is a reason to expect the trait to matter without assuming it will matter in exactly the way Western studies report.

What connects these findings to the present question is the distinction between capability and enactment. Financial literacy supplies capability. Whether capability is enacted depends on planning orientation, self-discipline and the tendency to follow through on intentions, which is close to the definition of conscientiousness. The theory of planned behaviour makes a related point at the level of intention, holding that perceived control over a behaviour shapes whether intention becomes action (Ajzen, 1991). Hershey et al. (2007) applied a similar logic to retirement, showing that psychological dispositions influence how far planning knowledge is translated into concrete steps.

Each trait suggests a different mechanism.

Openness. Open individuals seek information, tolerate unfamiliar options and adapt existing routines. Where a financial decision requires stepping outside a familiar pattern, for example moving from a savings account into a pension product, openness should help. Nga and Yien (2013) found openness associated with

financial decision-making, and Akhtar et al. (2018) with stock market participation. The mechanism is about acting on new information, which should matter most when the knowledge in question is elementary and the barrier is behavioural rather than technical.

Conscientiousness. Conscientious individuals are organised, deliberate and persistent. Retirement preparation is a long-horizon task with no immediate feedback, which is the class of task on which conscientiousness has the largest effect. If any trait should amplify the return to financial knowledge, this is the one.

Extraversion. Extraverts are sociable, assertive and reward sensitive. Sociability may improve access to financial advice, while reward sensitivity may work against deferred consumption. Because the two pull in opposite directions, the net effect is hard to sign in advance.

Agreeableness. Agreeable individuals are cooperative and trusting. Trust may make them more receptive to advice, including poor advice, and cooperativeness may direct resources toward family obligations rather than personal accumulation. Again the direction is ambiguous.

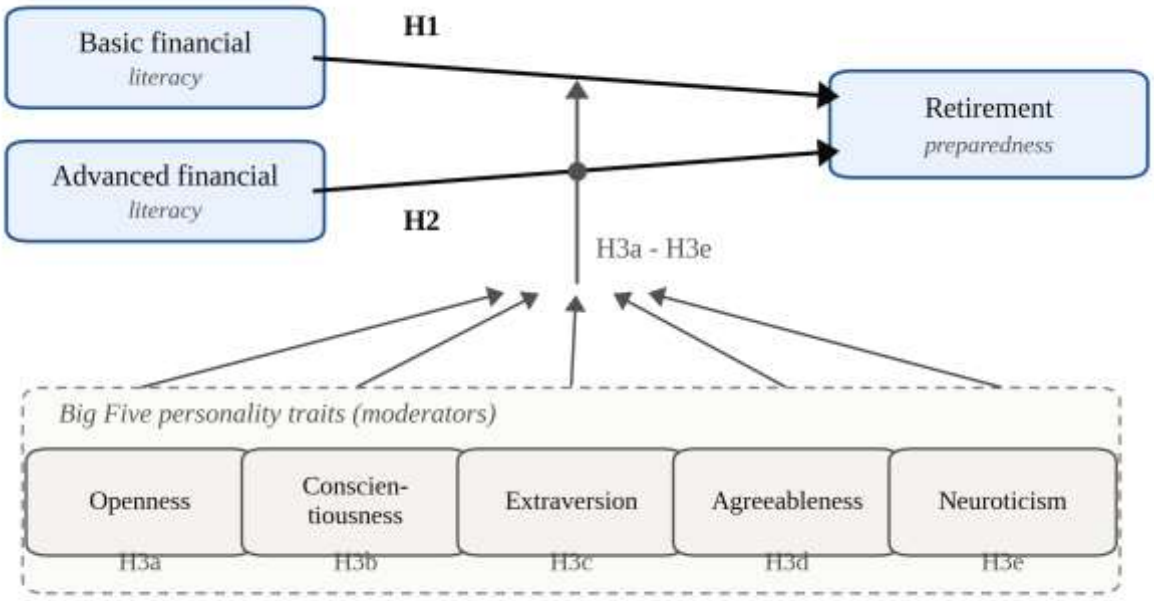
Neuroticism. Neurotic individuals experience negative affect and respond poorly to uncertainty. Harrison and Chudry (2011) found that people scoring high on neuroticism struggled with financial decisions. Anxiety about the future might either prompt precautionary saving or produce avoidance of financial planning altogether.

Because prior findings are mixed for three of the five traits, the hypotheses are stated as non-directional tests of moderation, with only conscientiousness and openness carrying a clear expectation of positive interaction.

> **H3.** The Big Five personality traits moderate the relationship between financial literacy and retirement preparedness, specifically:
> **H3a** openness, **H3b** conscientiousness, **H3c** extraversion, **H3d** agreeableness and **H3e** neuroticism.

Figure 1 sets out the research model.

Figure 1
Conceptual model



Note. Solid arrows represent the direct hypotheses. The vertical arrow represents the moderating hypotheses, which apply to both financial literacy paths.

3. Method

3.1 Design and setting

The study uses a cross-sectional survey design with a deductive, quantitative logic. Karachi was selected as the study site because it is the country's largest city and its principal commercial centre, which concentrates formal sector salaried employment. The target population was full-time working professionals aged 25 to 50 employed across industries in Karachi. Under Pakistani labour law full-time work is defined as 45 to 49 hours per week, and this definition was used as the screening criterion.

3.2 Sample and procedure

Data were collected through an online questionnaire and through printed copies distributed at workplaces. Sampling combined probability and non-probability elements, using simple random selection where organisational access permitted and convenience, purposive and expert sampling elsewhere. Three hundred and two usable responses were obtained and retained for analysis.

Two sample size checks were applied. The conventional calculation for a population above 20,000 at a 95 per cent confidence level and 5 per cent margin of error requires 377 respondents for population estimation. The inverse square root method of Kock and Hadaya (2018), which is the appropriate rule for partial least squares path models, requires a minimum of 267 cases to detect the smallest path in the model ($\beta = 0.152$) at 5 per cent significance with 80 per cent power. The achieved sample of 302 satisfies the second criterion, which governs the estimation reported here, and falls short of the first. This is noted as a limitation on descriptive generalisation in Section 7.

A pilot study with ten respondents preceded the main collection and was used to confirm that item wording was interpreted consistently.

3.3 Measures

The instrument was adapted from established sources and organised into four blocks: demographics, financial literacy at basic and advanced levels, the Big Five traits, and retirement preparedness. Financial literacy items followed the basic and advanced batteries developed by Lusardi and Mitchell (2011), covering interest compounding, inflation and money illusion at the basic level and instrument knowledge, the interest rate to bond price relationship and diversification at the advanced level. Personality was measured with a short five-factor inventory using three items per trait, consistent with brief measures such as that of Gosling et al. (2003). Retirement preparedness was captured with three items on the extent of planning, provision and expected adequacy of post-retirement resources, in the tradition of perceived preparedness measures such as that of Segel-Karpas and Werner (2014). All non-demographic items used Likert response scales.

Seven advanced literacy items and three basic literacy items were retained after measurement assessment. Appendix A summarises the construct composition and sources.

3.4 Analytical approach

Partial least squares structural equation modelling was used, estimated in SmartPLS. The choice was driven by three features of the study. The model is complex, with two exogenous constructs, five moderators and ten interaction terms predicting a single endogenous construct. The interest is in prediction and in explaining variance in the target construct rather than in confirming global model fit. And the distributional assumptions of covariance-based estimation are not comfortably met by Likert-scaled literacy and preparedness data. These are the conditions under which Hair et al. (2019) recommend the variance-based approach.

Measurement quality was assessed in the sequence set out by Hair et al. (2022): indicator loadings, internal consistency through Cronbach's alpha and composite reliability, convergent validity through average variance extracted, and discriminant validity through the Fornell and Larcker (1981) criterion and cross loadings. Collinearity among predictors was checked through variance inflation factors.

Moderation was specified using the product-indicator approach with standardised indicators, which is appropriate for reflective constructs measured with a small and comparable number of items (Becker et al., 2018; Memon et al., 2019). Significance was obtained from 5,000 bootstrap resamples. Explanatory power was assessed with R^2, and out-of-sample predictive relevance with the Stone and Geisser Q^2 statistic computed by blindfolding at an omission distance of seven (Stone, 1974; Geisser, 1974). The PLSpredict procedure of Shmueli et al. (2019) has since superseded blindfolding as the preferred prediction check and could not be applied retrospectively here, a point taken up in Section 7.

Two additions were made to the original analysis for this paper. First, confidence intervals were reconstructed for every path from the reported coefficient and its bootstrap t statistic, which allows readers to judge precision rather than only significance. Second, because ten moderating hypotheses were tested in one model, p values for the interaction terms were adjusted using the Benjamini and Hochberg (1995) false discovery rate procedure. Both are reported alongside the conventional results in Section 4.

3.5 Common method variance

All constructs were measured from the same respondents at one point in time, which raises the possibility of common method variance. Two features of the design reduce the concern. The financial literacy blocks use knowledge items rather than self-assessment, so they do not share the evaluative frame of the

preparedness items. In addition, the study's central claims rest on interaction terms, and common method variance biases interaction estimates toward zero rather than away from it, which makes the significant moderations conservative rather than inflated. Procedural remedies recommended by Podsakoff et al. (2003), including anonymity assurances and separation of item blocks, were applied during collection. Post hoc, the indicator-level variance inflation factors range from 1.134 to 3.976, so all fall below the conventional threshold of 5, although several exceed the more conservative value of 3.3. It should be noted that Kock (2015) applies the 3.3 threshold to construct-level full collinearity rather than to indicator collinearity, and that test could not be computed from the available output. Running it is recommended as an additional check.

4. Results

4.1 Sample profile

Table 1 describes the 302 respondents. Men account for 57.6 per cent of the sample. Educational attainment is high, with 43.4 per cent holding an undergraduate degree and a further 39.7 per cent a postgraduate qualification. The sample is young, with 56.3 per cent aged 25 to 30 and a further 38.7 per cent aged 31 to 40, leaving only 5 per cent above the age of 40. Reported monthly income is concentrated at the lower end, with 56.3 per cent earning below Rs 30,000. Industry representation is dispersed, with retail (12.6 per cent) and banking (10.9 per cent) the largest identified sectors and a majority of respondents working in industries outside the listed categories.

The age and income profile deserves comment because it shapes how the findings should be read. This is a sample of early-career professionals rather than of workers approaching retirement. Retirement preparedness for this group is a matter of habits being formed rather than of accumulated adequacy, which is arguably the more useful margin for policy but which limits inference about people close to the retirement decision.

Table 1

Profile of respondents (n = 302)

Characteristic	Category	Frequency	%
Gender	Male	174	57.6
	Female	128	42.4
Education	Intermediate	21	7.0
	Undergraduate	131	43.4
	Graduate	30	9.9
	Postgraduate	120	39.7
Age (years)	25 to 30	170	56.3
	31 to 40	117	38.7
	41 to 50	12	4.0
	Above 50	3	1.0
Monthly income	Below Rs 30,000	170	56.3
	Rs 31,000 to Rs 40,000	117	38.7

	Rs 41,000 to Rs 50,000	12	4.0
	Above Rs 50,000	3	1.0
Industry	Fast moving consumer goods	21	7.0
	E-commerce	23	7.6
	Banking	33	10.9
	Retail	38	12.6
	Construction	5	1.7
	Education	14	4.6
	Other	168	55.6

Note. Percentages are column percentages within each characteristic and may not sum to exactly 100 because of rounding. Three respondents (1.0 per cent) reported an age above 50, marginally outside the intended sampling frame of 25 to 50 years; they were retained in the analysis.

4.2 Measurement model

Table 2 reports the assessment of the reflective measurement model. Twenty-eight indicators were retained across eight constructs. Loadings range from 0.497 to 0.973. Three items, one advanced literacy item and two basic literacy items, were removed during purification because their removal raised average variance extracted above the 0.50 threshold proposed by Chin (1998), following the rule set out by Hair et al. (2022) for items loading between 0.40 and 0.70.

Internal consistency is satisfactory throughout. Cronbach's alpha ranges from 0.703 to 0.874 and composite reliability from 0.742 to 0.918, so every construct clears the 0.70 benchmark and none exceeds 0.95, which would suggest redundant items. Average variance extracted ranges from 0.512 to 0.788, supporting convergent validity for all eight constructs. Variance inflation factors fall between 1.134 and 3.976, all below the threshold of 5, so collinearity does not distort the path estimates.

One measurement feature warrants attention. The basic financial literacy construct meets every threshold but does so with markedly uneven loadings of 0.973, 0.584 and 0.497. The construct is therefore carried disproportionately by a single indicator, and its composite reliability of 0.742 sits below its Cronbach's alpha of 0.759, which is unusual. Basic literacy results should be read with this in mind, and Section 7 returns to the point.

Table 2

Assessment of the reflective measurement model

Construct	**Item**	**Loading**	**α**	**CR**	**AVE**	**VIF**
Advanced financial literacy	AFL1	0.727	0.850	0.884	0.522	3.145
	AFL2	0.675				3.854
	AFL3	0.741				2.077
	AFL4	0.732				2.497
	AFL5	0.665				1.841

	AFL6	0.811				2.760
	AFL7	0.699				1.836
Basic financial literacy	BFL3	0.584	0.759	0.742	0.512	3.584
	BFL4	0.973				1.171
	BFL5	0.497				3.400
Openness	OPEN1	0.777	0.760	0.831	0.626	1.305
	OPEN2	0.917				1.843
	OPEN3	0.657				1.943
Conscientiousness	CONS1	0.902	0.874	0.918	0.788	1.853
	CONS2	0.903				3.771
	CONS3	0.858				3.160
Extraversion	EXTR1	0.841	0.806	0.879	0.707	3.366
	EXTR2	0.850				3.350
	EXTR3	0.831				1.289
Agreeableness	AGRE1	0.886	0.864	0.915	0.782	3.491
	AGRE2	0.860				3.976
	AGRE3	0.906				1.669
Neuroticism	NEUR1	0.945	0.839	0.902	0.758	3.421
	NEUR2	0.931				3.630
	NEUR3	0.716				1.458
Retirement preparedness	RP1	0.775	0.703	0.832	0.623	2.173
	RP2	0.854				2.317
	RP3	0.735				1.134

Note. α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted; VIF = variance inflation factor. Three items (one advanced and two basic financial literacy items) were removed during purification to raise AVE above 0.50. All AVE and CR values were recomputed from the reported loadings and reproduce the values shown.

4.3 Discriminant validity

Table 3 reports the Fornell and Larcker (1981) criterion. The square root of average variance extracted on the diagonal exceeds every off diagonal correlation in the corresponding row and column for all eight constructs. The tightest comparison is between openness and conscientiousness, where the correlation of 0.707 sits below the diagonal values of 0.791 and 0.888 respectively. Cross loadings, reported in Appendix B, show every indicator loading most strongly on its assigned construct. Discriminant validity is therefore supported on both criteria.

The correlation structure itself is informative. The five personality traits correlate moderately with one another, between 0.359 and 0.707, which is normal for brief five-factor measures. The two literacy dimensions correlate only 0.047 with one another, which is lower than most studies report and indicates that in this sample basic and advanced knowledge are close to independent. Retirement preparedness correlates positively with both literacy dimensions and negatively, though weakly, with all five traits.

Table 3

Discriminant validity: Fornell and Larcker criterion

	AFL	AGRE	BFL	CONS	EXTR	NEUR	OPEN	RP
AFL	**0.723**							
AGRE	0.068	**0.884**						
BFL	0.047	0.218	**0.715**					
CONS	0.087	0.688	0.278	**0.888**				
EXTR	0.062	0.542	0.064	0.604	**0.841**			
NEUR	0.125	0.516	0.021	0.359	0.482	**0.870**		
OPEN	0.151	0.705	0.150	0.707	0.640	0.517	**0.791**	
RP	0.179	-0.160	0.223	-0.071	-0.074	-0.115	-0.228	**0.789**

Note. Diagonal values in bold are the square root of the average variance extracted for each construct. Off-diagonal values are construct correlations. AFL = advanced financial literacy; AGRE = agreeableness; BFL = basic financial literacy; CONS = conscientiousness; EXTR = extraversion; NEUR = neuroticism; OPEN = openness; RP = retirement preparedness.

4.4 Structural model

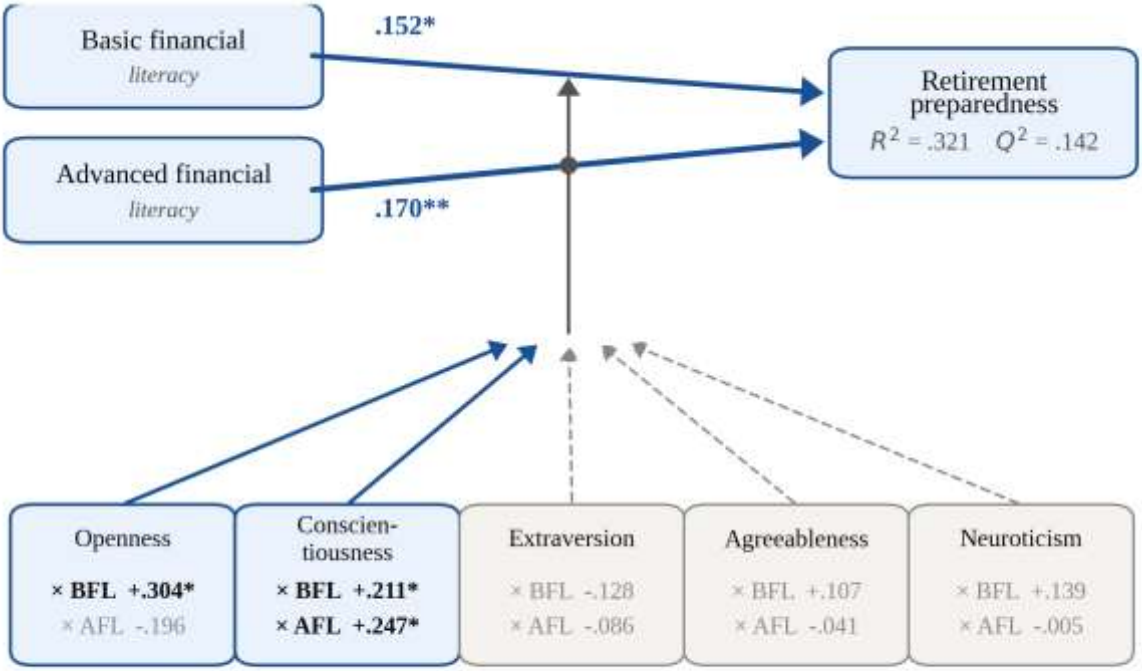
The model explains 32.1 per cent of the variance in retirement preparedness. Under the benchmarks of Henseler et al. (2009) this falls between weak and moderate, which is a reasonable result for a single antecedent domain measured on a young sample. The Q^2 value of 0.142 exceeds zero, confirming that the model has out-of-sample predictive relevance for the endogenous construct.

Both direct hypotheses are supported. Advanced financial literacy predicts retirement preparedness with a standardised coefficient of 0.170 (t = 3.065, p = 0.002, 95 per cent CI 0.061 to 0.279), supporting H2. Basic financial literacy predicts preparedness with a coefficient of 0.152 (t = 2.064, p = 0.040, 95 per cent CI 0.008 to 0.296), supporting H1. The confidence interval for basic literacy nearly touches zero, so the two effects should not be treated as equally well established despite their similar point estimates.

Figure 2 presents the estimated structural model with its path coefficients.

Figure 2

Structural model with estimated path coefficients



Solid arrows and boldface coefficients are significant at p < .05; dashed arrows are not significant.
*p < .05, **p < .01. Coefficients are standardised path estimates from 5,000 bootstrap resamples.

Table 4 reports the full set of paths, and Figure 3 displays them with confidence intervals.

Table 4

Structural model results

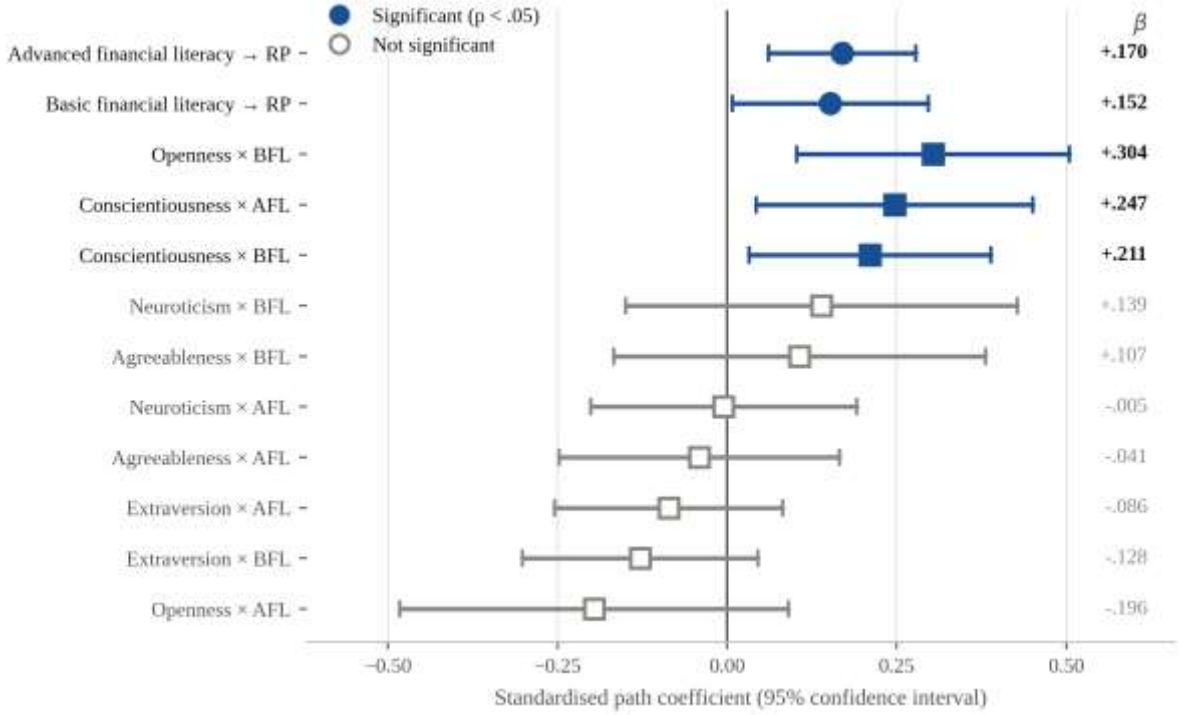
Path	*β*	SE	*t*	*p*	95% CI	*q* (FDR)	Result
Direct effects							
Advanced financial literacy → RP	0.170	0.055	3.065	0.002	[0.061, 0.279]	n.a.	Supported
Basic financial literacy → RP	0.152	0.074	2.064	0.040	[0.008, 0.296]	n.a.	Supported
Moderating effects							
Openness × BFL → RP	0.304	0.103	2.964	0.003	[0.103, 0.505]	0.030	Supported
Conscientiousness × AFL → RP	0.247	0.104	2.376	0.018	[0.043, 0.451]	0.070	Supported
Conscientiousness × BFL → RP	0.211	0.091	2.319	0.021	[0.033, 0.389]	0.070	Supported

Neuroticism × BFL → RP	0.139	0.147	0.943	0.346	[-0.150, 0.428]	0.494	Not supported
Agreeableness × BFL → RP	0.107	0.140	0.765	0.445	[-0.167, 0.381]	0.556	Not supported
Neuroticism × AFL → RP	-0.005	0.100	0.050	0.960	[-0.201, 0.191]	0.960	Not supported
Agreeableness × AFL → RP	-0.041	0.106	0.388	0.698	[-0.248, 0.166]	0.776	Not supported
Extraversion × AFL → RP	-0.086	0.086	1.003	0.316	[-0.254, 0.082]	0.494	Not supported
Extraversion × BFL → RP	-0.128	0.089	1.443	0.150	[-0.302, 0.046]	0.362	Not supported
Openness × AFL → RP	-0.196	0.146	1.340	0.181	[-0.483, 0.091]	0.362	Not supported

Note. β = standardised path coefficient; SE = standard error derived from β and the bootstrap t statistic; CI = 95 per cent confidence interval derived on a normal-theory approximation; q = p value adjusted across the ten moderating tests using the Benjamini and Hochberg (1995) false discovery rate procedure. Estimates are based on 5,000 bootstrap resamples. $R^2 = 0.321$; $Q^2 = 0.142$. BFL = basic financial literacy; AFL = advanced financial literacy; RP = retirement preparedness.

Figure 3

Standardised path coefficients with 95 per cent confidence intervals



Note. Intervals are derived from the reported coefficient and its bootstrap t statistic assuming symmetry, and are therefore normal-theory approximations to the percentile bootstrap intervals. BFL = basic financial literacy; AFL = advanced financial literacy; RP = retirement preparedness.

4.5 Moderation

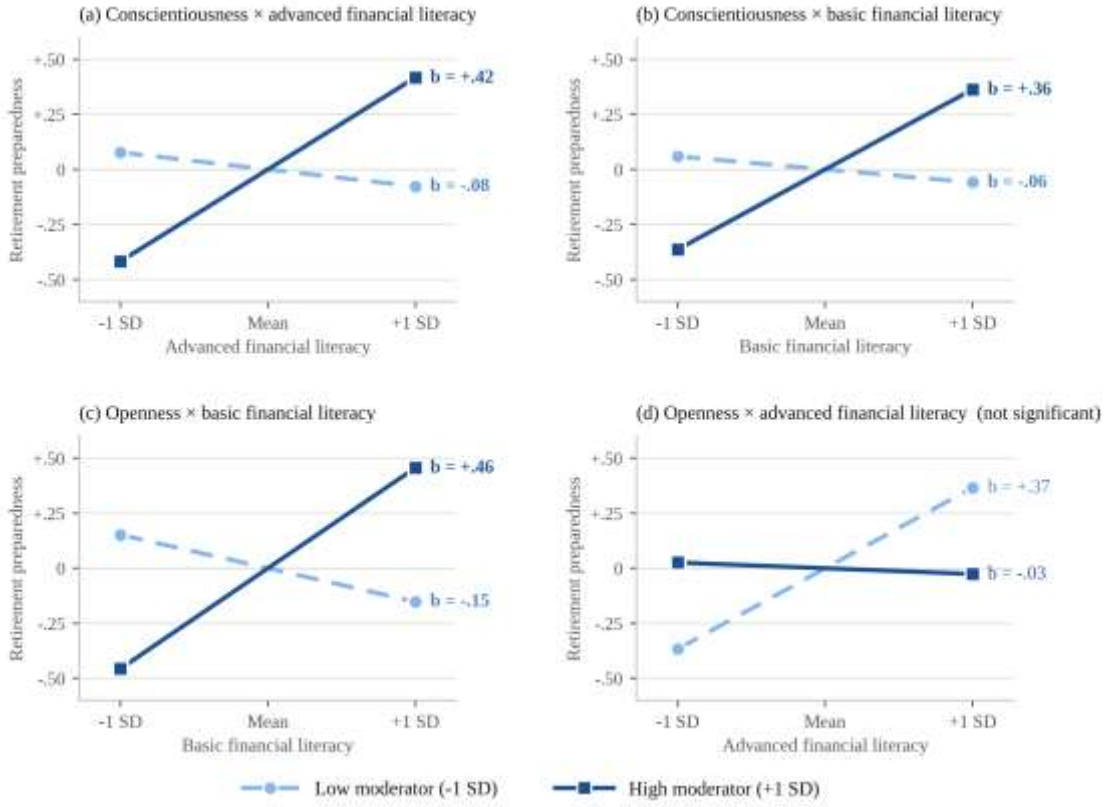
Of the ten interaction terms, three reach conventional significance. Conscientiousness strengthens the relationship between advanced financial literacy and preparedness (β = 0.247, p = 0.018) and between basic financial literacy and preparedness (β = 0.211, p = 0.021), supporting H3b. Openness strengthens the basic literacy path (β = 0.304, p = 0.003) but not the advanced literacy path (β = -0.196, p = 0.181), giving partial support to H3a. Extraversion, agreeableness and neuroticism produce no significant interaction on either path, so H3c, H3d and H3e are not supported. Coefficients for these six terms range from -0.128 to 0.139, and every confidence interval comfortably spans zero.

Simple slope analysis makes the pattern concrete. Figure 4 plots the conditional relationship between each literacy dimension and preparedness at one standard deviation below and above the mean of the moderator. Panel (a) shows that among respondents low in conscientiousness the slope of preparedness on advanced literacy is -0.08, effectively flat, while among those high in conscientiousness it is +0.42. Panel (b) shows the same reversal for basic literacy, with slopes of -0.06 and +0.36. Panel (c) shows the openness effect on basic literacy, with slopes of -0.15 and +0.46.

The substantive reading is direct. In this sample the association between financial knowledge and retirement preparation is not merely weaker for people low in conscientiousness. It is absent. The aggregate coefficients of 0.170 and 0.152 are averages across two groups whose behaviour differs qualitatively, not just in degree.

Figure 4

Conditional relationship between financial literacy and retirement preparedness at low and high levels of the moderator



Note. Lines show the conditional slope of retirement preparedness on financial literacy at one standard deviation below and above the mean of the moderator. Because moderator main effects were not estimated in the reported model, vertical intercepts are not identified and the panels display slope differences only. Panels (a) to (c) show significant interactions; panel (d) is included for contrast.

4.6 Multiplicity adjustment

Testing ten interaction terms at a 5 per cent threshold carries a real risk of chance findings. Under a complete null the expected number of false positives is 0.5, and the probability of obtaining at least one is about 40 per cent. The Benjamini and Hochberg (1995) correction addresses this by controlling the proportion of false discoveries among rejected hypotheses rather than the probability of any false discovery, which makes it better suited to exploratory moderation testing than a Bonferroni adjustment. Applying it to the ten moderation p values gives adjusted values of 0.030 for openness by basic literacy, 0.070 for both conscientiousness terms, and values above 0.36 for the remaining seven.

Only the openness by basic literacy interaction therefore survives at a 5 per cent false discovery rate. The two conscientiousness interactions survive at 10 per cent. The conscientiousness findings should be read as well supported but not definitive on this sample alone, and their consistency across both literacy dimensions, which the correction does not exploit, is itself evidence in their favour. The seven null results are unaffected by the adjustment.

Table 5 summarises the hypothesis tests under both readings.

Table 5

Summary of hypothesis tests

H	Statement	β (BFL / AFL)	p (BFL / AFL)	At p < .05	After FDR
H1	Basic financial literacy is positively associated with retirement preparedness	0.152	0.040	Supported	n.a.
H2	Advanced financial literacy is positively associated with retirement preparedness	0.170	0.002	Supported	n.a.
H3a	Openness moderates the financial literacy relationship	0.304 / -0.196	0.003 / 0.181	Partly supported	Supported (basic)
H3b	Conscientiousness moderates the financial literacy relationship	0.211 / 0.247	0.021 / 0.018	Supported	Suggestive
H3c	Extraversion moderates the financial literacy relationship	-0.128 / -0.086	0.150 / 0.316	Not supported	Not supported
H3d	Agreeableness moderates the financial literacy relationship	0.107 / -0.041	0.445 / 0.698	Not supported	Not supported
H3e	Neuroticism moderates the financial literacy relationship	0.139 / -0.005	0.346 / 0.960	Not supported	Not supported

Note. Where two values are shown, the first refers to the moderation of the basic financial literacy path and the second to the moderation of the advanced financial literacy path. "Suggestive" indicates an effect that is significant at $p < .05$ but survives false discovery rate adjustment only at $q < .10$.

5. Discussion

5.1 Financial literacy predicts preparedness, and the advanced level predicts it better

The direct results align the Pakistani case with the international pattern. Both dimensions of financial literacy are positively associated with retirement preparedness, and advanced literacy carries the stronger and more precisely estimated effect. This reproduces the ordering reported by Niu et al. (2020) for China and by van Rooij et al. (2012) for the Netherlands, and it is consistent with the human capital interpretation offered by Lusardi and Mitchell (2014). It also runs against the null result reported by Farrar et al. (2018), whose sample and setting differ substantially.

The size of the effects deserves a plain reading. A standardised coefficient of 0.170 means that a one standard deviation increase in advanced literacy is associated with about one-sixth of a standard deviation increase in preparedness. That is a real but modest association. Financial literacy is one input among several, and the 32.1 per cent of variance the full model explains leaves most of the variation in preparedness to income, employment security, family structure, access to products and factors this study did not measure. Claims that financial education alone can close a retirement savings gap are not supported by numbers of this magnitude.

The near zero correlation between basic and advanced literacy in this sample, at 0.047, is worth noting in its own right. In most studies the two move together, since advanced knowledge normally builds on basic knowledge. Their independence here suggests that respondents may be acquiring the two through different

channels, with basic concepts absorbed through everyday transactions and advanced concepts through formal education or occupational exposure. If that interpretation is right, it strengthens the case Karaa and Kuğu (2016) made for modelling them separately.

5.2 Conscientiousness determines whether knowledge is used

The clearest finding of the study is that conscientiousness governs whether financial knowledge translates into retirement preparation. It does so for both literacy dimensions, which rules out the possibility that the effect is an artefact of one particular knowledge domain. The simple slope pattern is stronger than a typical amplification effect. Among respondents low in conscientiousness, additional financial knowledge is associated with no improvement in preparedness at all.

This fits what is known about the trait. Conscientiousness predicts saving and debt outcomes in household panel data (Brown and Taylor, 2014) and sound financial management practice in survey work (Donnelly et al., 2012). It also fits the structure of the retirement task. Preparing for retirement requires sustained action with no proximate reward, delayed and ambiguous feedback, and repeated opportunities to defer. These are the conditions under which trait differences in self-regulation express themselves most strongly. Knowing that inflation erodes cash does not by itself move money out of a current account. Someone has to decide to do it, and then do it again the following month.

For the wider literature this suggests a specific amendment. Financial literacy is best understood not as a direct cause of preparation but as a resource whose value depends on the disposition of the person holding it. The average effect estimated in any literacy study is therefore partly a function of the personality composition of its sample, which offers a parsimonious explanation for why the literature's effect sizes vary as much as they do.

5.3 Openness matters at the basic level only

Openness strengthens the basic literacy path but not the advanced literacy path, and the contrast between the two is instructive. Where knowledge is elementary and widely shared, what distinguishes people who act is willingness to try something unfamiliar, and this is the core of openness. Where knowledge is advanced, the constraint is different. Advanced literacy is scarcer, and a person who holds it has usually already crossed the informational barrier that openness helps to cross. The trait then has less work to do.

This dimension-specific reading is only available because the two literacy levels were modelled separately. Had they been combined into a single construct, the openness effect would have been diluted and probably reported as non significant, which is a concrete illustration of why the distinction is worth preserving. It also connects to Nga and Yien (2013) and Akhtar et al. (2018), both of whom found openness associated with active financial engagement rather than with financial knowledge as such.

5.4 The traits that did not matter

Extraversion, agreeableness and neuroticism produced no reliable interaction on either path. For extraversion and agreeableness this is consistent with the theoretical ambiguity noted earlier, since each trait carries mechanisms that push in opposing directions and may cancel. For neuroticism, the absence of an effect is more surprising given Harrison and Chudry's (2011) finding that anxious individuals struggle with financial decisions. One explanation is that neuroticism affects the experience of financial decision-making more than its outcome, so that anxious respondents find planning unpleasant without necessarily doing less of it.

A more prosaic explanation should not be dismissed. Three-item trait measures have limited reliability, the sample is young and relatively homogeneous, and interaction terms are estimated with less precision than

main effects. The confidence intervals for these six terms are wide, spanning roughly 0.3 to 0.6 in width. A null result under these conditions is an absence of evidence rather than evidence of absence, and it should be tested again on a larger and more varied sample before being treated as settled.

5.5 Placing the results alongside earlier Pakistani work

Research on financial behaviour in Pakistan has documented low literacy levels, limited stock market participation and a preference for tangible assets (Ali et al., 2011; Klapper et al., 2015). Work on personality has concentrated on investors and entrepreneurs rather than on ordinary employees, with Akhtar et al. (2018) linking traits to stock market participation and Moueed and Hunjra (2020) examining affect in investment decisions. The present study connects these two strands for the first time on a general working sample and on a retirement outcome rather than an investment one.

The finding that both literacy dimensions predict preparedness is consistent with the general expectation in this literature, but the moderation results add something the Pakistani work has not previously shown. If the effectiveness of financial knowledge depends on disposition, then national estimates of financial literacy, of the kind reported by the Standard & Poor's survey, are an incomplete guide to what raising literacy would achieve. Two countries with identical literacy scores could see very different behavioural returns to a literacy programme depending on the distribution of self-regulatory traits and, more importantly, on whether the institutional environment supplies the structure that low-conscientiousness individuals lack. That is a testable proposition and a natural extension of this work.

5.6 What the multiplicity correction implies for this literature

The false discovery rate results deserve a comment that goes beyond this study. Moderation models in applied partial least squares work routinely specify five, ten or more interaction terms and then report each at a conventional 5 per cent threshold, without acknowledging what that does to the chance of a spurious finding. Reporting an adjusted reading costs little and changes what a reader should conclude, as it does here, where the two conscientiousness effects move from significant to suggestive. The convention of reporting only unadjusted p values in these models is likely contributing to the instability of moderation findings across studies in this field, and the practice of reporting both is worth adopting more widely.

6. Implications

6.1 Theoretical implications

Three implications follow for research on financial literacy. First, moderation by disposition belongs in the standard specification. A literacy study that reports only an average effect is reporting a quantity that depends on unmeasured sample composition. Second, the basic and advanced distinction should be maintained rather than collapsed, since the two levels attract different moderators. Third, and more generally, the finding supports a capability and enactment view of financial behaviour in which knowledge sets an upper bound on what a person can do while disposition determines how much of that bound is realised. This aligns the financial literacy literature with the broader behavioural insight that intention and action are separated by a self-regulation problem (Ajzen, 1991).

6.2 Practical implications

For employers, the finding argues against relying on financial education alone. A workplace seminar delivers knowledge, and this study suggests that knowledge will be converted into preparation by the conscientious employees who were probably going to prepare anyway. The employees who need help most are precisely those for whom the seminar changes least. Programmes that pair education with structural support, including automatic enrolment into a voluntary pension scheme, payroll deduction, default contribution

rates and scheduled annual reviews, substitute an external structure for the internal one that low-conscientiousness employees lack. Where such programmes are offered, the evidence here suggests they should be extended to younger employees rather than concentrated on those approaching retirement, since the sample studied here is at the stage where contribution habits are formed.

For financial service providers, the openness result points toward the design of first products. Where the obstacle to a customer's first pension contribution is unfamiliarity rather than ignorance, reducing the perceived novelty of the product, through simplified onboarding, small initial commitments and familiar analogies, addresses the actual constraint.

For policymakers, the implications reach beyond the education agenda. Pakistan's pension coverage problem is structural, and financial literacy operates at the margin of a system that reaches a small minority of workers. Raising literacy is worth doing, and the coefficients here support it, but it is a complement to coverage expansion rather than a substitute for it. Given the fiscal trajectory of the public pension bill (Pakistan Institute of Development Economics, 2024), the case for building voluntary and portable retirement products for the private and informal workforce is the larger policy question, and financial education is one input into making such products usable once they exist.

7. Limitations and future research

Several limitations qualify the findings.

The design is cross-sectional, so the direction of the relationships cannot be established. It is plausible that people who prepare for retirement acquire financial knowledge in the process rather than the other way round, and the present data cannot separate the two. A longitudinal design that measures literacy before preparedness would settle this.

The sample is drawn from one city and skews young and toward lower-income brackets, with more than half of respondents reporting monthly income below Rs 30,000 and 95 per cent aged under 41. The achieved sample of 302 satisfies the requirement for detecting the smallest modelled path but falls short of the 377 needed for population estimation at conventional precision. Findings should not be generalised to Pakistan as a whole, to older workers, or to the informal workforce that constitutes the majority of national employment.

Retirement preparedness is self-reported and measured with three items. Objective indicators, such as actual contribution rates or accumulated balances, would be stronger dependent variables and are the natural next step where administrative data can be linked.

The basic financial literacy construct is carried disproportionately by one indicator, and its reliability profile is uneven. Results involving that construct, including the openness interaction that is the study's strongest moderation finding, should be replicated with a fuller basic literacy battery before being relied upon.

Two elements of the analytical toolkit have moved on since the data were analysed. Discriminant validity was assessed using the Fornell and Larcker criterion and cross loadings, whereas the heterotrait-monotrait ratio proposed by Henseler et al. (2015) has since become the preferred test and is more sensitive, particularly for the moderately correlated personality constructs in this model. Predictive relevance was assessed by blindfolding rather than by the PLSpredict procedure of Shmueli et al. (2019), which compares out-of-sample error against a naive benchmark. Both should be reported in any replication.

Finally, personality was tested only as a moderator. Pinjisakikool (2017a) and others have argued that traits may also shape the acquisition of financial literacy itself, which would make them antecedents as well as

boundary conditions. A model that allows both roles, ideally with mediation through planning intention or risk tolerance, would give a fuller account than the one estimated here.

8. Conclusion

Among salaried professionals in Karachi, both basic and advanced financial literacy are associated with retirement preparedness, with the advanced level the stronger predictor. That much reproduces what the international literature reports. The more interesting result is what happens when personality enters the model. Conscientiousness determines whether financial knowledge is used at all, with the relationship between literacy and preparedness effectively disappearing among respondents low on that trait, and openness plays a similar though narrower role at the basic literacy level. Extraversion, agreeableness and neuroticism show no such effect.

The practical message follows from the interaction rather than from the main effects. In a country where formal pension arrangements reach fewer than one person in ten above pension age, financial education is a reasonable policy instrument, but it is not a uniform one. It works for people already disposed to act on what they learn. Reaching everyone else requires designing the structure of the decision, not only the content of the lesson.

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Appendix A. Construct composition and sources

The instrument was adapted rather than newly developed. The table below records how many items were retained for each construct after measurement purification, the item codes used throughout the paper, and the sources from which the items were adapted. Full item wording is available from the author.

Construct	Items retained	Item codes	Adapted from
Basic financial literacy	3	BFL3 to BFL5	Lusardi and Mitchell (2011); Karaa and Kuğu (2016)
Advanced financial literacy	7	AFL1 to AFL7	Lusardi and Mitchell (2011); van Rooij et al. (2012)
Openness	3	OPEN1 to OPEN3	McCrae and John (1992); Gosling et al. (2003)
Conscientiousness	3	CONS1 to CONS3	McCrae and John (1992); Gosling et al. (2003)
Extraversion	3	EXTR1 to EXTR3	McCrae and John (1992); Gosling et al. (2003)
Agreeableness	3	AGRE1 to AGRE3	McCrae and John (1992); Gosling et al. (2003)
Neuroticism	3	NEUR1 to NEUR3	McCrae and John (1992); Gosling et al. (2003)
Retirement preparedness	3	RP1 to RP3	Segel-Karpas and Werner (2014); Hershey et al. (2007)

Appendix B. Cross-loadings of measurement items

Each indicator loads most strongly on the construct it was assigned to, which supports item level discriminant validity. Values in bold are loadings on the assigned construct. AFL = advanced financial literacy; BFL = basic financial literacy; AGRE = agreeableness; OPEN = openness; CONS = conscientiousness; EXTR = extraversion; NEUR = neuroticism; RP = retirement preparedness.

Item	AFL	BFL	AGRE	OPEN	CONS	EXTR	NEUR	RP
AFL1	**0.727**	0.129	0.096	0.141	0.144	0.041	0.110	0.101
AFL2	**0.675**	0.101	0.006	0.093	0.084	0.021	0.098	0.098
AFL3	**0.741**	0.115	0.182	0.178	0.190	0.077	0.158	0.147
AFL4	**0.732**	0.034	-0.031	0.088	0.006	-0.006	0.072	0.139
AFL5	**0.665**	0.004	0.048	0.078	-0.011	0.067	0.099	0.091
AFL6	**0.811**	-0.060	0.047	0.101	-0.009	0.051	0.068	0.188
AFL7	**0.699**	-0.069	-0.066	0.066	0.064	0.078	0.009	0.069
BFL3	-0.095	**0.584**	0.084	-0.024	0.083	0.067	-0.038	0.059
BFL4	0.082	**0.973**	0.225	0.177	0.292	0.055	0.037	0.239
BFL5	-0.104	**0.497**	0.059	-0.010	0.080	0.010	-0.077	0.010
AGRE1	0.038	0.234	**0.886**	0.561	0.569	0.439	0.418	-0.136
AGRE2	0.099	0.130	**0.860**	0.665	0.594	0.520	0.493	-0.167
AGRE3	0.025	0.235	**0.906**	0.627	0.671	0.461	0.440	-0.107
OPEN1	0.074	0.090	0.735	**0.777**	0.570	0.525	0.513	-0.145
OPEN2	0.166	0.155	0.528	**0.917**	0.635	0.569	0.403	-0.229
OPEN3	0.040	0.164	0.476	**0.657**	0.588	0.489	0.402	0.001
CONS1	0.118	0.299	0.671	0.646	**0.902**	0.544	0.325	-0.082
CONS2	0.073	0.230	0.587	0.650	**0.903**	0.550	0.329	-0.049
CONS3	0.012	0.174	0.538	0.579	**0.858**	0.513	0.300	-0.047
EXTR1	0.048	-0.009	0.425	0.439	0.399	**0.841**	0.448	-0.043
EXTR2	0.074	0.066	0.436	0.476	0.447	**0.850**	0.485	-0.054
EXTR3	0.038	0.079	0.485	0.632	0.607	**0.831**	0.325	-0.079
NEUR1	0.144	0.076	0.546	0.535	0.388	0.496	**0.945**	-0.117
NEUR2	0.150	-0.009	0.508	0.465	0.344	0.456	**0.931**	-0.109
NEUR3	-0.017	-0.039	0.215	0.311	0.151	0.258	**0.716**	-0.064
RP1	0.099	0.218	-0.124	-0.109	-0.092	-0.103	-0.057	**0.775**
RP2	0.097	0.228	-0.122	-0.142	-0.017	-0.003	-0.070	**0.854**
RP3	0.205	0.102	-0.130	-0.259	-0.066	-0.078	-0.130	**0.735**