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Psychometric Evaluation of the Grable and Lytton Risk Tolerance Scale in Pakistani Context

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Abstract

The difference in Investor's personality creates an urge to understand individual financial behaviour. Investor's personality thus is a combination of various traits and Risk tolerance is among one of those. Being one of the crucial and complex constructs, financial risk needs a reliable assessment tool. The Grable and Lytton Risk Tolerance Scale (GL-RTS) is used in many countries for this; however, its applicability within the Pakistani context had not been fully examined. This study aimed to evaluate the reliability and validity of the GLRTS among Pakistani retail investors. The study used a quantitative approach. A sample of 434 respondents was collected through an online structured questionnaire. Confirmatory Factor Analysis (CFA) was conducted using AMOS to test the scale structure. Reliability was assessed using Cronbach's alpha and Composite Reliability (CR), while validity was examined through Average Variance Extracted (AVE) and model fit indices such as CFI, RMSEA, and SRMR. Results indicated good model fit (CFI = 0.949, RMSEA = 0.040, SRMR = 0.044), and Composite Reliability exceeded the acceptable threshold (CR = 0.779). However, AVE was low (0.2361), suggesting weak convergent validity. These findings suggest that while the scale structurally fits the data, certain items may require adaptation or removal to improve validity in the local context. Future research should consider cross-cultural studies to refine the scale further. The validated tool, with minor adjustments, can be valuable for financial advisors and researchers in understanding investor behaviour in emerging markets like Pakistan.

Keywords: Financial Risk, Risk Tolerance, Investor Behaviour, Psychometric Scale

Introduction

Investment behaviour is composed of various factors like financial literacy, confidence, investment experience and risk tolerance (Goud, 2022; Subramaniam and Velnampy, 2017; Kaur and Koushik, 2016). Risk is considered as one of the very important aspects of investors' personality. Risk cast its effect to choose investment options (Qureshi, Sayılır, and Doğan, 2025). The term "*Risk*" is usually explained in terms of uncertainty or probability of getting negative outcome (Dichev,1998). However, in finance the fluctuation from the expected return in any direction is known as a risk (Moller and Askeljung, 2020). The term risk is divided into systematic i.e. uncontrollable and unsystematic risks (William, 1964). The systematic risk is unavoidable while unsystematic risk is the one targeted to get abnormal returns. Some investors are risk lovers whereas some are risk aversive. Between these

extremes are the ones who are risk neutral. However, number of researchers concluded that one investor can change his/her attitude towards risk in different situations (Vlaev et al., 2010). This research tends to evaluate the famous Grable and Lyton Scale of risk Tolerance (GL-RTS) that was first developed in 1991 through various trials (Grable and Lytton, 2001). The scale covers a series of questions designed to capture different aspects like attitudes, preferences, and behaviours associated with financial risk. The scale is assumed to be one of the best scales to measure the risk bearing tendency of retail investors in many countries. However, the scale is mostly tested in developed countries and very few evidence are present in developing countries. The validity of any psychometric scale is not universal i.e. it is context dependent (Van de Vijver and Leung, 2021). A scale developed in one socio-economic and cultural environment may not accurately covers the exact constructs when employed in alternate settings. One study, Shah et al., 2020, has checked Grable and Lytton Risk scale in Pakistan but there are several aspects yet to be address. For example, the target audience of the study was limited to business students or graduates. This study aims to investigate the scale's consistency by considering a diverse sample without the restriction of having knowledge related to specific background. Moreover, the study also tries to assess which item of the GL-RTS is not performing well in Pakistan's context and whether its removal or modification can increase the accuracy of measured response. The benefit to test the scale reliability in developing countries like Pakistan is important for all types of retail investors to shape the strategies and select assets classes to develop investment portfolio by keeping in mind their risk bearing behaviour.

Knowing the risk tolerance capacity not only gives behavioural satisfaction in case of sudden loss but also helps the investor to understand his/her own personality. For financial companies and the banking industry, the study may help in modifying financial products by keeping in mind the propensity to bear risk of their target clients, ultimately increasing subjective satisfaction of investors. Pakistan represents a unique blend of diversified investors' culture. The country thus provides a unique context for studying financial behaviour due to its different and unique socio-economic dynamics, cultural attitudes toward risk, low levels of financial literacy, and a growing yet underdeveloped financial sector (SBP, 2020; Atkinson & Messy, 2012; Qureshi & Khan, 2016, Kempson et al., 2005). With a predominantly young population (UNDP, 2017) and amplifying digital access to financial markets, a deep insight of how people in Pakistan recognize and tolerate financial risk is enhancing its importance. Still,

even with this relevance, there is a significant gap in empirical research whether established Western measurement tools, such as the GL-RTS, are appropriate for the Pakistani context. Factors such as religious beliefs, family influence, gender roles, and economic instability may influence risk tolerance in ways not captured by scales developed in other countries.

This research is a step towards bridging the global-local gap in financial behaviour assessment and promotes a broader understanding of cross-cultural validity in financial psychology.

Literature Review

Risk in Financial Decision Making

In general, the term "risk" is usually associated with the chances or probability of uncertainty in expected outcome that an individual is willing to withstand. The ability and propensity to tolerate risk fluctuates among individuals. In Finance, risk tolerance is defined as the ability to take a chance (either gain or lose) for some or all the investment for a greater return or outcome (Vrdoljak, 2024). Risk is also defined as a general psychological characteristic that exists within an individual, considering the decisions they must make regarding their entire wealth and future investments (Davies and Brooks, 2014). These characteristics then influence investor behaviours. Investment behaviour is characterized by two theoretical essential components: investor habit and investor decision making. Financial markets are interpreted as interactive settings where human behaviour reveals both complex rational and irrational tendencies. (Nathan J. Bennett, 2017) To create an investment portfolio that aligns with their risk tolerance, individual characteristics, and available options, investors must evaluate the risk and return associated with each potential investment opportunity. It is essential for investment objectives and risk tolerance to be in harmony; otherwise, the investor may encounter significant challenges during investment decision making (Hoffmann, 2017). This indicates that investor behaviour involves the traits that motivate these investment decisions. Similarly, an individual's behaviour, along with psychological factors such as beliefs, societal perceptions, personal preferences, and biases, plays a crucial part in the process of making financial decisions. (Lodhi, 2014). According to authors Aini and Lutfi, overconfidence and risk tolerance also have a role to play in investor decision-making. This implies that investors may behave more aggressively in the market because of their self-perception of their capacity to tolerate risk. Similarly, an investor's capacity for taking on risk, hence influences their tactical investment decision making (Aini, 2019).

Behavioural finance used to discuss and develop theoretical bases to demonstrate how psychological influences, and cognitive biases affect the financial behaviour of individuals and markets (Kumar, 2017; Victor Ricciardi, 2000). Understanding the influence of these factors is particularly important for better investment decisions, as effective portfolio strategies must consider investor behaviour and perceptions. The degree of variability in invested returns needs to be assessed as risk is a critical concept in behavioural finance and investment decision-making (Sabri Elkrghli, 2023; Sattar, Toseef and Sattar, 2020). Hence, risk is the likelihood of potential dangers and uncertainty that an investor is ready to endure. (Nevenka Vrdoljak, 2024; Duy Bui et. al, 2021). Many times, risk tolerance is also seen as a product of personal qualities, especially personality features (Pak and Mahmood, 2015; John Grable, 1999). Researchers have asserted that retail investors' personality significantly influences risk tolerance (Pompian, 2012) and subsequent investment decisions (Hod,2015), suggesting that individuals with certain traits may exhibit higher or lower risk tolerance (Mukhdoomi and Shah, 2023). Studies reveal that psychological elements like fear and self-assessed risk perception also significantly influence financial risk tolerance (Ricciardi, 2008; Kesari, 2020). Evaluating one's risk tolerance is crucial to successful portfolio management and financial planning (Nguyen, 2019). This ultimately leads to the assessment of risk tolerance for effective financial planning and portfolio management (Alhawamdeh et al., 2023). In this connection, financial advisors often utilize risk tolerance assessments to tailor their advice to clients' unique risk profiles, reinforcing the idea that the importance of understanding individual risk tolerance could not be undermined in financial systems (Zioło, 2019).

The concept of risk tolerance is also essential in understanding investor behaviour and their decision-making processes in financial markets (Lytton, 2018; Owusu, 2023; Grable, 2000; Linh Nguyen, 2016; Almansour et. al, 2023; Jain and Kesari, 2022). Researchers, portfolio managers, and financial advisors can all benefit from knowing how risk tolerance is calculated. Financial risk tolerance influences everything from asset allocation to volatility management in a portfolio (Likitapiwat and Johnson, 2018) and it is a one of the major factors in determining investment strategies and financial advice. Risk tolerance involves investors' overall enduring readiness to accept possible future concessions (Nevenka Vrdoljak, 2024). The emphasis is on the outcomes rather than on their attitudes toward risk or their inclination to take chances right away also known as their "risk appetite" (Hillson and Murray,

2012). There are many researchers that indicate the importance of risk tolerance in re-shaping investment strategies in financial institutions (Bayar et al, 2020; Rahies. M.K. et al , 2022). In relevant literature, attempts have been made to define financial risk tolerance (FRT) through two approaches. A normative model is thus used to explain FRT derived from the concepts propagated by traditional finance and descriptive models i.e., the models that take into consideration the behavioural as well as psychological aspects in the context of behavioural finance. Nevertheless, it has been suggested that individual FRT could be affected by a variety of determinants, including financial, demographic, social, cultural, physical, and ethical influences (Bayar et al, 2020; Grable J. E., 2016). The impact of personality factors on risk tolerance is a crucial aspect to comprehend investor behaviour. Previous research has shown, personal traits like age, gender, and financial knowledge can have a big impact on how people perceive risk and how much risk they can tolerate (Bucciol, 2017; Dohmen, 2011; Grable, 2000).

Financial Risk Scales used in Literature

Most famous scales used to measure "Financial Risk Tolerance" in literature, according to their reliability and factors covered, are mentioned in Table.1 below:

Table.1: Risk Tolerance Scales Used In Literature

Year	Scale Name	Developed By	Description	Reliability
1996	Grable & Joo Risk Tolerance scale (precursor)	John E. Grable & Sang Eun Joo	Early effort to develop psychometric risk tolerance scales.	N= 220 Cronbach's alpha= .80
1997	Barsky Risk Tolerance Survey	Barsky, Juster, Kimball & Shapiro	Based on economic experiments and hypothetical income gambles to determine risk preference. Work was done in 1990.	N= 11,707 It was not a psychometric study so "Cronbach's α" is not applicable
1997	SCF Risk Tolerance Question	U.S. Federal Reserve (Survey of	A single question scale used in large surveys: "Which of the following	N= 2659 Risk tolerance was used as a single item

		Consumer Finances)	statements comes closest to the amount of financial risk that you are willing to take when you save or make investments?"	question so Cronbach's α" is not applicable
2000	Grable and Lytton Risk Tolerance Scale	John E. Grable & Ruth H. Lytton	Most widely cited 13-item psychometric scale with excellent reliability and validity.	N=160279 "α"=.77
2005	Fina Metrica Risk Tolerance Profiling	Paul Resnik & Geoff Davey	Used profiling method of Commercial risk measurement with strong psychometric backing	Worked on different dimensions suggested the range of "α" for risk tolerance scale .70-.80
2008	DOSPERT Scale (Risk-Taking in Finance)	Weber, Blais & Betz	Measures risk attitudes across multiple domains including finance; widely used in behavioural finance.	N=1795 multi-level model, "α" range = .74-.83
2011	Risk Capacity Scale (developed alongside Fina Metrica)	Multiple contributors	Measures ability to take risks (opposite to willingness). Often used in conjunction with tolerance tools.	.85–.89 (average across versions)
2018	Oxford Risk Tolerance Assessment	Oxford Risk	A digital-first psychometric tool combining behavioral insights and AI for customized risk profiling.	N= more than 1500 And "α" not disclosed

Financial Risk Scales used in Literature

Reason for Choosing GL-RTS

Grable and Lytton developed a scale in 2000 to measure risk tolerance (GL-RTS).It is one of the most frequently used tools to measure financial risk tolerance (FRT). It has been applied and validated in numerous countries, providing researchers and financial planners with a reliable way to understand risk attitudes. The scale was widely tested on more than 160,279 respondents and proved to be a reliable and a valid tool to measure risk tolerance as precisely as the scale was first developed (Kuzniak, Rabbani, Heo, Ruiz-Menjivar, & Grable, 2015). The scale estimated reliability as measured by Cronbach's alpha is reported between 0.70-0.90.

Validity and Reliability of the Grable and Lytton Risk Tolerance Scale (GL-RTS)

Below is a summary of how the scale has performed in terms of reliability and validity across different cultural contexts as well as its versatility and adaptability across different countries.

Table.2: Scale Reliability and Validity across Countries and Cultures

Country	Authors	Reliability (Cronbach's alpha, "α")	Validity and explanation
United States	Kuzniak et al. (2015)	0.70–0.80	Demonstrated strong internal consistency and construct validity using factor analysis. Widely accepted as the foundational study.
Brazil	Study: Gava & Vieira (2008); Nobre et al. (2016)	0.76	The scale was translated into Portuguese and showed solid construct validity in the Brazilian context via exploratory and confirmatory factor analysis.
Pakistan .	Study: Shah et al. (2020)	0.63	Factor analysis indicated acceptable construct validity. The study focused on business graduates and demographic differences in risk attitudes
South Africa	Metherell (2011);	0.72	Supported by factor analysis. The study examined the relationship between

	Mabalane (2015)		financial risk tolerance and variables like gender and income.
China .	Study: CHFS (2011)	0.75	Comparative analysis with U.S. data showed the scale's strong performance in China, affirming cross-cultural applicability.
Finland Study:	University-based research	0.74	Applied to Finnish university students; the factor structure was validated, and internal consistency was found to be good
Singapur Study:	Nanyang Technological University	0.77	Validity: Scale performed well in academic studies; construct validity confirmed through CFA.
United Kingdom Study:	Imperial College London	0.73	Scale applied in research on international students; valid structure confirmed in the UK context.
Netherlands Study Study: Grable & Lytton (1999);	Leiden University	0.75	The scale was used in cross-cultural research and retained acceptable psychometric properties in Dutch samples.

Cronbach's Alpha (α) is a measure of internal consistency. Values above 0.70 are normally considered acceptable, but 0.60–0.70 can be tolerated in exploratory research.

Methodology

The major aim of this work is to check the significance of GL-RTS' reliability and validity in Pakistani context. The data in current study is gathered through online questionnaires. The research is related to the psychometric assessment of individual investor's behaviour describing investors' propensity to tolerate risk. After data cleaning a total of 434 complete responses are analysed. To check the reliability Cronbach "α" is used. Composite Reliability (CR) is also measured. CR is a measure of the internal consistency of a set of items that form a latent construct, often considered more precise than Cronbach's alpha, especially in

structural equation modelling (SEM) and Confirmatory Factor Analysis (CFA). Construct validity is assessed through model fit indices i.e. comparative fit index (CFI), Root Mean square error of approximation (RMSEA) and standardized mean square residuals (SRMR). The average variance explained (AVE) is calculated to check Convergent Validity. AVE measures how well a construct is represented by its indicator variables.

Demographic Statistics of the Sample: Figure 1 (a to e)

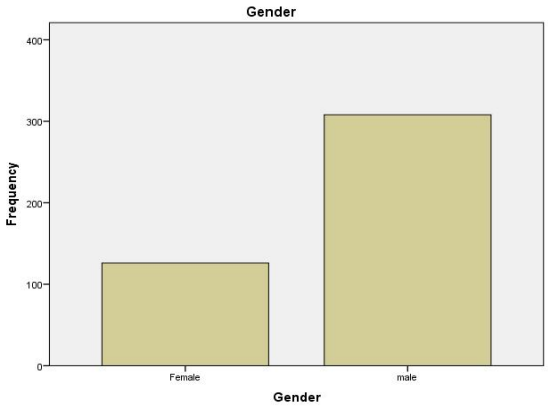

Figure 1.a

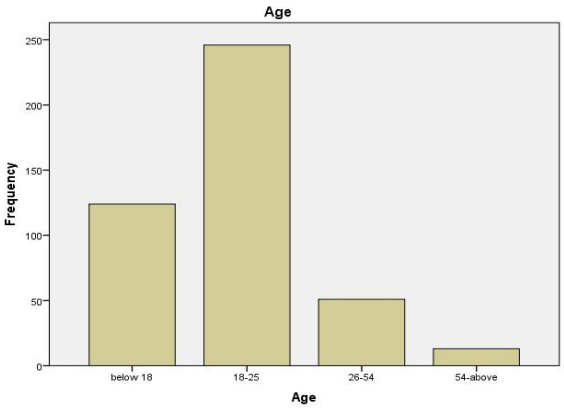

Figure 1.b

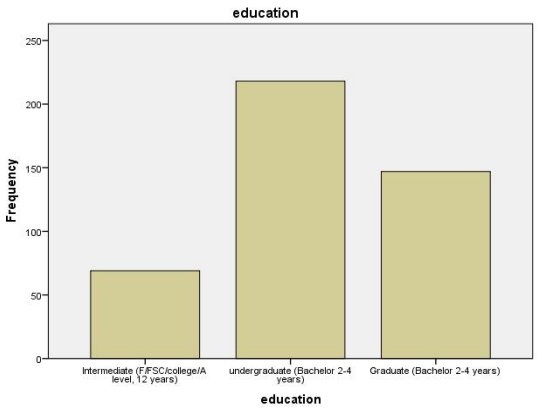

Figure 1.c

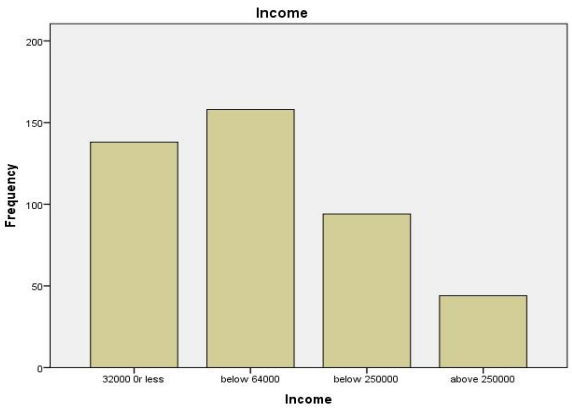

Figure 1.d

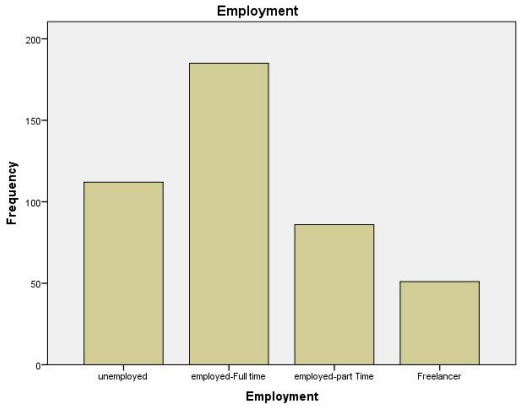

Figure 1.e

Figure 2 is about the frequency distribution of scores of respondents measured on GL-RTS. The distribution appears symmetrical but has slight tails on both sides. The scores range from 13 to 44, showing a broad variation in risk attitudes.

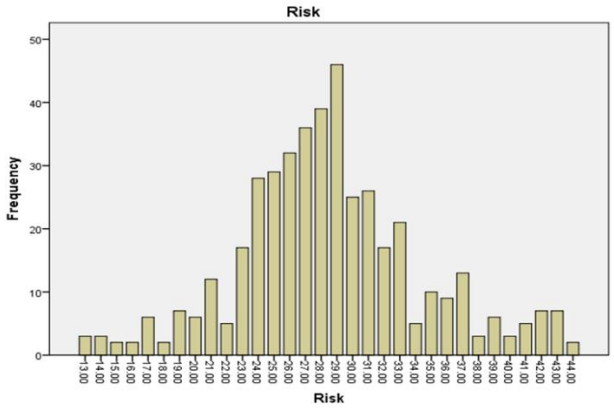

Figure 2: Histogram Representing Risk Tolerance Scores Distribution among Respondents

Reliability Statistics "α"		
Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**No. of Items**
.776	.792	13

Table.3: Reliability Values of Scale in Current Data

Inter-Item Correlation Matrix													
Items	**Risk1**	**Risk2**	**Risk4**	**Risk5**	**Risk6**	**Risk7**	**Risk8**	**Risk9**	**Risk10**	**Risk11**	**Risk12**	**Risk13**	**Risk3**
Risk1	1.000	.154	.219	.177	.201	.161	.364	.278	.245	.298	.283	.166	-.006
Risk2		1.000	.243	.214	.293	.266	.326	.255	.169	.167	.390	.195	.085

Risk4	1.000	.237	.294	.207	.305	.211	.150	.313	.332	.238	.098
Risk5		1.000	.204	.275	.258	.239	.202	.288	.330	.179	.179
Risk6			1.000	.183	.360	.241	.289	.218	.337	.212	.185
Risk7				1.000	.167	.166	.151	.256	.333	.120	.190
Risk8					1.000	.336	.306	.333	.355	.183	.149
Risk9						1.000	.251	.286	.280	.137	.129
Risk10							1.000	.179	.208	.177	.118
Risk11								1.000	.306	.147	.173
Risk12									1.000	.245	.160
Risk13										1.000	.086
Risk3											1.000

Table.3.1: Internal Consistency of Each Item

	Mean	Min.	Max.	Range	Max. / Min.	Variance	N of Items
Item Variances	.752	.235	1.164	.930	4.961	.113	13
Inter-Item Correlations	.226	-.006	.390	.395	-67.756	.006	13

Table.3.2: Summary of Item Statistics

Items	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Risk1	26.46	31.131	.379	.225	.765
Risk2	26.12	28.763	.425	.241	.760
Risk4	26.46	30.443	.449	.223	.759
Risk5	26.45	30.599	.431	.203	.760
Risk6	26.00	28.617	.464	.250	.755
Risk7	26.12	29.229	.382	.190	.765
Risk8	26.03	27.958	.527	.335	.748
Risk9	27.11	31.858	.429	.211	.765
Risk10	26.90	32.233	.371	.173	.768

Risk11	26.02	28.180	.451	.250	.757
Risk12	26.65	29.424	.567	.341	.749
Risk13	26.23	30.077	.312	.119	.773
Risk3	25.98	30.847	.238	.097	.781

Table.3.3: Item-Total Statistics

Measure	Estimate	Threshold	Interpretation
CMIN	109.564	--	--
DF	65	--	--
CMIN/DF	1.686	Between 1 and 3	Excellent
CFI	0.949	>0.95	Acceptable
SRMR	0.044	<0.08	Excellent
RMSEA	0.040	<0.06	Excellent
PClose	0.904	>0.05	Excellent
AVE	0.23	>0.05	Concern

Data Analysis and Interpretation

The composite reliability (CR) is used to check the strength of items. Higher CR value shows the construct is well defined and explained by the items under consideration. According to the reliability analysis the CR value as shown in Table.3 is 0.779 which is within the acceptable range (cut off value ≥ 0.70) and indicates a strong item correlation. In other words, items are measuring the same construct and contributing effectively to the scale. Inter-item Correlation is used to determine the consistency and reliability of items within a scale. Thus depicts the correlation between each item and the total score of the scale. Also, the Inter-item correlations are between 0.2 and 0.5 reveals that items are measuring the single construct.

Construct Validity (CV) on the other hand tends to explain whether a scale or an instrument is measuring the construct it is intended to measure. (including AVE). It also reveals that the variance proportion in the construct is variance explained by the instrument. AVE (Average Variance Extracted): This measures the proportion of variance in a construct that is caused by the construct itself, instead of measurement error. AVE value of 0.5 or

higher is generally considered acceptable.

The CFA results demonstrated a good model fit: CFI = 0.94, RMSEA = 0.040, SRMR = 0.04, indicating that the one-factor structure of the Grable and Lytton Risk Tolerance Scale is appropriate for the Pakistani sample. However, the AVE value calculated explains only ~23.6% of the variance in observed items as explained by the latent factor. In simple words latent construct (Risk Tolerance) does not explain enough variance in the items meant to measure it.

This suggests that:

a. Some items may be poorly worded, irrelevant, or not reflective of the construct.
b. The scale may not be fully valid in the Pakistani context without modification.

The AVE value is below the threshold of 0.50, suggesting inadequate convergent validity. This may be due to cultural or contextual misalignment of some scale items. Further refinement and contextual adaptation may be necessary for use in the Pakistani setting.

i. Model fit is excellent — the overall structure is working well.
ii. AVE is poor — meaning item-level performance is weak, despite the good structure.

It shows that Grable & Lytton's scale may structurally work in Pakistan, but not all items are meaningful indicators in this context.

Although the model demonstrated excellent fit (CFI = 0.949, RMSEA = 0.040), the AVE was significantly below threshold (0.2361), indicating weak convergent validity. This suggests that while the structural model is sound, several items may not adequately reflect the risk tolerance construct in the Pakistani context. Mean Inter-Item Correlation (0.226). A mean inter-item correlation between 0.15 and 0.50 is considered acceptable for unidimensional scales (as per Clark & Watson, 1995). Our value (0.226) suggests moderate internal consistency and that the items are measuring related but not redundant aspects of the same construct — in this case, risk tolerance. minimum Correlation (-0.006) A slightly negative correlation may indicate a weak or non-functional item, possibly not aligned well with the underlying construct. One item might need to be reviewed, especially the one with very low factor loading (e.g., Risk3 = 0.259 from earlier data). Maximum Correlation (0.390). This is within a good range and shows that no pair of items is overly correlated, which helps avoid multicollinearity or redundancy. Range (0.395) A wide range shows variability in how strongly the items relate to one another. This is not necessarily bad but indicates a need to inspect items on either extreme for content alignment.

After removing item "3"

1. Mean Inter-Item Correlation (0.244)
a. This is slightly higher than before (was 0.226), indicating better internal consistency among the remaining 12 items.
b. Still within the ideal range of 0.15–0.50, which supports one-dimensionality and meaningful item variation.
2. Minimum Correlation Increased (Now 0.120)
a. The lowest inter-item correlation is now positive, suggesting that all remaining items contribute positively to the underlying construct of risk tolerance.
b. Removing Item 3 (which had a low factor loading and was previously negatively or very weakly correlated) has strengthened the scale.
3. Maximum Correlation (Still 0.390)
a. No items are excessively correlated (> 0.80), which helps avoid redundancy.
4. Variance Decreased (0.006 → 0.004)
a. Lower variance among inter-item correlations suggests that the remaining items are more uniformly related, which is a good sign of internal coherence.

Conclusion

The values of CMIN/DF, CFI, RMSEA, SRMR, and PC lose are proof that the model is statistically solid. However, Low AVE indicates a Validity Issue.

Removing Item 3 was a good decision — it improved the overall psychometric profile of our scale.

The scale now demonstrates:

a. Better consistency
b. No negative or problematic correlations
c. More unified construct measurement.

Recommendation and Future Implications

The study has checked the scale reliability and validity on general population i.e. collected data through online survey and convenience sampling is used. By making the sample size wider and including more female participants can give more realistic picture of propensity to tolerate risk in financial settings. The model fit indices are although within the prescribed thresholds, the AVE value which is below 0.5 indicates that the scale's convergent validity should be checked further. The low-loading items like Item 3 should be carefully reviewed,

revised, or removed in future adaptations to improve the psychometric robustness of the instrument.

Moreover, as the RT is one of the major however, a complex concept should not ignore the cultural aspect. There is a need to test the scale in relation with cultural aspects of investors personality. therefore, financial advisors, analysts and policymakers in Pakistan should consider adopting a culturally adapted version of this scale. By customizing the scale to better align with local financial literacy levels, religious considerations (e.g., interest prohibition in Islamic finance), and investment norms can enhance its accuracy and utility.

In terms of future research, it is imperative to conduct larger-scale validation studies across diverse demographics in Pakistan, such as rural vs. urban populations, gender, age, and income levels.

In conclusion, while the Grable and Lytton Risk Tolerance Scale demonstrates potential for use in Pakistan, refinements and broader validations are necessary to ensure its effectiveness and relevance. The study lays the groundwork for more culturally sensitive, data-driven approaches to understanding and managing financial risk attitudes in emerging markets.

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