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Test-Wiseness, Test Anxiety, Reading Strategies Metacognitive Awareness, and Reading Comprehension Test Performance: A SEM Study

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Abstract

A major concern of language testing researchers has for long been the identification of construct-irrelevant influential cognitive and psychological bias factors in test takers' language test performance and recently the identification of the tentative models of interactions among such factors. With the same purpose in mind, the present study investigated the direct and indirect interrelationships among EFL learners' test anxiety, test-wiseness, reading metacognitive awareness, and reading comprehension test performance through a path analytic research design. To this end and on the basis of the related literature and the previous research findings, first a hypothesized model of the interrelationship among the variables was assumed. Next, 317 undergraduate and graduate students took the related questionnaires and tests. Finally, the obtained data were analyzed through AMOS statistical package and the hypothesized model of the interrelationship among variables was tested. According to the final verified model, test-wiseness directly predicted reading comprehension test performance, while test anxiety did not. Moreover, while reading strategies metacognitive awareness did not directly predict reading comprehension test performance, it was indirectly associated with reading comprehension test performance through the mediation of test-wiseness. In addition, both correlational and path analyses confirmed a strong negative relationship between reading strategies metacognitive awareness, and test anxiety. The findings highlight the importance of the language test takers' less test anxiety and enhanced metacognitive awareness of reading strategies and test-wiseness for their more reliable test-taking performances.

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Introduction

Performance evaluation and testing, in general, have played a decisive role in all social and educational undertakings and people have constantly been tested to prove or display their abilities and capabilities compared with a threshold level of performance. On this basis, tests have been applied for a wide range of individual and social purposes, one of the most important of which is for educational assessment and evaluation purposes.

In an evolutionary course of development, educational evaluation has gone through "at least a couple of distinct historical-conceptual phases" (Broad, 2007, 55). Primarily, it was viewed as a way of collecting information regarding what people had learned. From this vantage point, the concentration was on getting the most precise and reliable information possible. However, with the pass of time, evaluation started serving multiple purposes including collecting data, producing knowledge, and transforming curricula and educational procedures. Shohamy, (2001) introduces a third and comparatively novel phase of educational evaluation. From this point of view, policymakers have considered the changes that assessment has the power to bring about and started to use evaluation in a different way. They have fully realized that tests have come to function as a policy tool that may affect the lives of diverse groups of stakeholders including students, educators, and even common citizens.

Considering the life-changing stakes of many educational tests and evaluation practices, an exclusively significant aspect of such practices is the validity of the uses and interpretations of the test results for the intended purposes. On this basis, educational testing and evaluation experts and researchers have for long explored different theoretical and practical aspects of test validity. As Ferrier et al. (2011) contend, the most crucial feature is for a test to be valid for its intended use, and validity may be jeopardized when the factors affecting the test taker's score or performance are not related to its given underlying construct. This may justify why the identification and characterization of individual features affecting test performance and their impact magnitude on individuals' test performance have increasingly drawn language testing experts and researchers' attention (e.g., Bachman, 2007; Phakiti, 2003, 2008).

Bachman (2007) for example maintains that language test performance may be affected by a wide variety of factors and it is fundamental to know what these factors are and how they may influence the test scores. Hence, researchers have addressed this concern from both theoretical and empirical perspectives. From a theoretical stand point, communicative language ability frameworks (e.g., Bachman, 1990; Bachman & Palmer, 1996, Canale & Swain, 1980; Canale, 1983; Celce-Murcia et al., 1995) have differentially identified some of such factors and their interrelations, and the conviction that if the language tests are to be used appropriately for the purposes they are intended, they need to be based on clear definitions of both the abilities and the measures. For instance, drawing upon the earlier models of communicative language ability Bachman and Palmer (1996) introduced topical knowledge, language knowledge, strategic competence, affect, and the characteristics of the language use or test task environment (context) as the underlying factors of communicative language ability.

On the other hand, and from an empirical perspective, studies have focused on the identification of influential cognitive and/or psychological factors in this regard (e.g., Bensoussan, 2012; Zaccoletti et al., 2020; Zhang et al., 2014)

On the basis of the abovementioned rationale, the investigation of the models or relation patterns of some underexplored psychological and/or cognitive factors including test anxiety, reading metacognitive awareness, test-wiseness, and reading comprehension test performance is aimed at in this study. Given that most of the studies in this area have been bivariate correlational in nature, the analysis of structural models of relationships among test anxiety, test-wiseness, reading metacognitive awareness, and reading comprehension test performance seems to be empirically novel and contributive to the field.

Literature Review

The componential factors of communicative language ability including topical knowledge, language knowledge, strategic competence, and affect, all interact with each other in (test/non-test) language use situations (Bachman & Palmer,1996), however; strategic competence is considered to play the central role (Fulcher & Davidson, 2007). According to (Bachman and Palmer 1996, 70), strategic competence comprises of "a set of metacognitive components or strategies which can be thought of as higher-order executive processes that provide a cognitive management function in language use". From another perspective, strategic competence refers to "a set of metacognitive strategies or higher-order processes that explain the interaction of knowledge and affective components of language use." (Fulcher & Davidson, 2007, 45).

In a language test context, strategies like test-management strategies, and test-wiseness strategies as components of strategic competence (Cohen, 2013) interact with affective schemata, defined as affective or emotional correlates of topical knowledge (Fulcher & Davidson, 2007), topical knowledge, and language use (Bachman & Palmer, 1996). Among other emotional correlates of topical knowledge in language test context, a typical relevant emotional status is testing anxiety which is viewed as a prominent psychological factor in such situations (Sarason & Sarason, 1990).

Test Anxiety

In addition to the knowledge of the elements and skills of language ability that make the main construct intended to be measured in language testing contexts, two main types of systematic sources of variations in test takers' language test performance are the test-takers' characteristics and the test method facets (Bachman, 1990). Test-takers' features or characteristics include a wide range of variables like age, gender, cultural background, socio-economic situation, and cognitive and psychological factors (e.g., cognitive strategies, metacognitive awareness, strategy use, anxiety, motivation, respectively), the effects of which on test performance have been frequently explored (e.g., Ghonsooly & Loghmany, 2012; Javanbakht & Hadian, 2014; Sarason & Sarason, 1990; Silaj et al., 2021; Zacolleti, 2020; Zeidner & Matthews, 2005).

Among such psychological traits, test anxiety has been shown to negatively affect the validity of the assessment practices and contribute to a kind of construct irrelevant variance in test scores (e.g., Downing, 2002; Zeidner & Matthews, 2017). In addition to the invalidity concerns of the tests, Bensoussan (2012, 203) maintains that "test anxiety interferes with a

reliable evaluation of language learning". But the exact nature of test anxiety is matter of controversy. Sarason et al. (1990, 475) define it in terms of a "situation-specific personality trait having two psychological components: worry and emotional arousal". Studies have indicated that test anxiety develops different types of relation with the test takers' performance type in the test situation (e.g., Liebert & Morris, 1967; Sarason, 1967; Sarason & Sarason, 1990, Stober, 2004). Zaccoletti et al. (2020), for example, explored the relationships among enjoyment, test anxiety, boredom, and control-value antecedents as predictors of reading comprehension and concluded that there is an indirect negative relationship between test anxiety and reading comprehension. They concluded that test anxiety has a significant negative effect on reading comprehension test scores while controlling for confounding variables such as gender and cognitive measures.

Silaj et al. (2021) also considered the relationships among test anxiety, metacognitive awareness, and reading comprehension ability and verified that students' higher post-state anxiety was associated with worse assessment performance. Moreover, students with higher levels of trait anxiety obtained lower grades. They concluded that test performance is directly affected by trait anxiety in high-stake tests.

Considering moderating variables such as gender, Chapell et al. (2005) reported that there was a slight inverse relationship between learners' test anxiety and Grade Point Average (GPA). They also verified a significant GPA difference between low-test-anxious and high-test-anxious female graduates while there was no significant difference between the GPAs of high-test-anxious and low-test-anxious male graduates.

In addition to the few briefly reviewed studies on test anxiety, researchers have also explored different aspects of test anxiety in different educational settings in the context of the present study, i.e., Iranian educational contexts, and have reported mixed results in this concern. Birjandi and Alemi (2010), and Salehi and Marefat (2014), for examples, verified a negative relationship between test anxiety and reading comprehension test performance while Javanbakht and Hadian (2014) indicated no significant relationships between the two variables.

Reading Strategies Metacognitive Awareness

According to the Bachman and Palmer's (1996) model of language ability, four different factors interact with each other in language use situation including topical knowledge, language knowledge, strategic competence, and affect. Among them, according to Cohen (2013), strategic competence can be broken into multiple parts including, language strategies, test-management strategies, and strategies that may produce construct-irrelevant diversity in test scores. In addition, Cohen (2013), believes that test-taking strategies include language learner, test-management, and test-wiseness strategies. Such strategies are in turn cognitive, metacognitive, affective, and social strategies types. Within these four types, cognitive and metacognitive strategies are shown to be mutually associated and at the same time influential on test performance (Purpura, 1999; Phakiti, 2003; Phakiti, 2008).

Over the years, studies have focused on such strategies in the context of reading comprehension test tasks (e.g., Hong-Nam & Page, 2014; Sheorey & Mokhtari, 2001; Silaj, et al., 2021; Zhang, et al., 2014). Hong-Nam and Page (2014) For example investigated the

metacognitive awareness of reading strategies and reading strategy use of Korean university students and their relationship with reading proficiency. The results of the study verified a linear relationship between strategy use and reading proficiency while the participants' gender as a moderator variable made no significant differences in their strategy use. On the other hand, according to Sheorey and Mokhtari (2001), the reader's metacognitive awareness of reading strategies is affected by many different factors including previous experiences, beliefs, and culture-specific instructional practices.

In addition, Silaj et al. (2021), Zhang et al. (2014), and Spada et al. (2006) have also underscored the positive relationship between metacognitive awareness of strategies in reading and reading comprehension test performance. It has also been indicated that metacognitive awareness of reading strategies can moderate the negative relationship between test anxiety and reading comprehension test performance which implies that there is a negative relationship between metacognitive awareness of strategies in reading and test anxiety (Spada, et al., 2006; Zhang, et al., 2014). In other words, the test takers with lower levels of test anxiety are more metacognitively aware of the test strategies they use; therefore, they perform better on reading comprehension tests (Mokhtari & Sheorey, 2001).

Finally, as Zhang (2002) and Zhang and Wu (2009) indicated, the high school students' active use of reading strategies and awareness of such strategies were linked to overall EFL reading comprehension performance. Zhang and Wu (2009) added that the students were using at least three categories of strategies, and the effects of using these strategies on reading proficiency were shown to be significant.

Test-Wiseness

Models of communicative language competence including Canale and Swain (1980), Canale (1983), Bachman (1990), Celce-Murcia et al. (1995), and Bachman and Palmer (1996) consider strategic competence as an integral part of communicative language ability. According to Bachman and Palmer (1996), strategic competence may have an essential role in the test-taking performance of the test takers (pp. 70-75). From Cohen's (2013) perspective, strategic competence can be broken down into two groups. The first group includes the strategies that can contribute construct-relevant variance to test results, namely language learner and test-management strategies, and the second group that are the strategies that may lead to construct-irrelevant variance and are called test-wiseness strategies.

Originally, Millman et al. (1965, 707) viewed test-wiseness as "a subject's capacity to utilize the characteristics and formats of the test and/or test-taking situation to achieve a high test score " but in a more recent conceptualization of the term, Cohen (2013, 5) defined test-wiseness strategies as "using knowledge of testing formats and other peripheral information to obtain responses—very possibly the correct ones—on language tests without engaging the requisite L2 knowledge and performance ability". Similar to Cohen (2013), Ferrier et al. (2011) considered test-wiseness as a variable that may explain construct-irrelevant variability in test scores.

Test-wiseness and its effects on language test performance including reading comprehension tests have been extensively studied in different educational contexts and its

effects on test performance and verbal achievement have been documented in both positive and negative ways over the last half a century. Classic works like Bajtelsmit (1977), Diamond and Evans (1972), and Dillard et al. (1977) for examples paved the way for more recent works like Wu and Stone (2015). Wu et al. (2015) explored an approach for test score validation that examines test takers' strategies for taking a reading comprehension test. The findings confirmed that three factors were influential in students' success in their reading comprehension tests, including processing the text for comprehending the meaning, using test-management strategies, and test-wiseness strategies.

On the other hand, studies are not scarce to conclude that test-wiseness may have no significant effect on test performance (e.g., Hayian & Relong, 2016; Tavakoli & Samian, 2014). Hayian and Relong (2016), for instance, focused on the relationships between Chinese students' test-wiseness strategy use and reading comprehension performance and indicated that no significant relationships were found between test-wiseness strategy use and reading comprehension test performance.

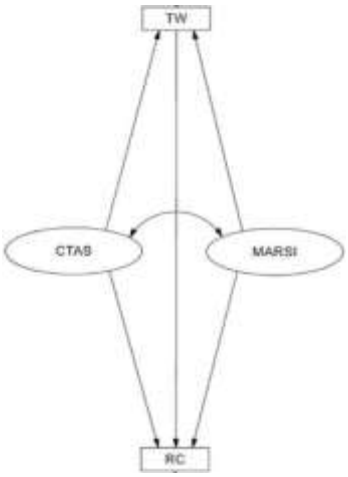
Having briefly reviewed the relevant literature, it was apparent that studies focusing on test-wiseness, test anxiety, reading strategies metacognitive awareness and reading comprehension have been mainly bivariate correlational studies in nature. Therefore, alternative approaches to the study of the multivariate nature of highly stressful cognitive processes like test-taking process seem to be more productive and revealing. On this basis, the present study aimed at the identification of a simultaneous model of the relationships among the given variables through a structural equation modeling approach. For the stated purpose, the following research question was formulated.

Research question and hypothesis

RQ: What is a valid model of the interrelationship among test anxiety, test-wiseness, metacognitive awareness of reading strategies, and reading comprehension test performance in the Iranian EFL context?

Hypothesis Model: On the bases of the theoretical assumptions and the previous research findings, the following model was hypothesized to tentatively model the relations among the given variables:

Figure 1. *The Primary Hypothesized Model*



Method

Participants

A total of 317 male and female university students majoring in English Translation, Teaching English as a Foreign Language (TEFL), English Literature, and Linguistics at B.A or M.A level participated in this study. B.A level participants were junior or senior students and M.A level participants were in the 3rd or 4th semester of their studies at Bu-Ali Sina University, Islamic Azad University of Hamedan, Allame Tabatabaei University, Razi University, and Tehran University. A convenience nonrandom sampling procedure was adopted for the selection of the participants. Furthermore, informed consent of the sample members to be included in the research project was obtained at the outset of the project and they were assured of the confidentiality of the collected research data.

Instruments

The following four sets of scales or tests were applied to collect the required data. A brief description of the structure and psychometric properties of each one is presented below.

Test-Wiseness Test

As a measure of the participants' test-wiseness level, Allan's (1992) Test-Wiseness Test including 33 multiple-choice items was applied. Each item is scored either 1 (for correct answers) or 0 (for incorrect answers). Originally, Allan (1992) reported α=0.75 as the reliability index of the test. In an attempt to ensure the reliability of the test in the context of the present study, the researchers re-estimated the Cronbach's alpha reliability index of the questionnaire (α=0.741). In addition, as is maintained by the test designer (Allan, 1992, 108), the construct validity of the test was "confirmed by the test content and to an extent by the testees' written protocols".

Cognitive Test Anxiety Scale

Cognitive Test Anxiety Scale (Cassady & Johnson, 2002) includes 27 four-point Likert scale items. It requires the test takers to indicate their agreement or disagreement on a scale of 1 (*not at all typical of me*) to 4 (*very typical of me*). The internal consistency of the scale is originally reported to be α=.91 (Cassady & Johnson, 2002); however, Cassady and finch (2014) re-estimated the reliability index of the questionnaire and verified an even higher index of internal consistency for the scale (α= 0.93)

To make sure of the reliability of this questionnaire in the context of the present study, Cronbach's Alpha measure of internal consistency was run on the main study data. The analysis revealed α =.71 level of internal consistency. According to Baghaei and Cassady (2014), the original version of CTAS is re-validated in many studies, and even some translations of the test are validated cross-culturally (e.g., Bourne et al., 2006; Cassady, 2004; Kapetanaki, 2010). In the context of the present study, the researchers applied the original version of the scale, though in an attempt to make sure of the validity of the scale in this new context, factorial analyses were carried out on the data and both the convergent and divergent validity of the questionnaire were confirmed.

Metacognitive Awareness of Reading Strategy Inventory-Revised (MARSI-R)

MARSI-R is a self-report inventory designed to assess respondents' awareness of reading strategies while taking reading comprehension tests. This scale is the revised version of MARSI (Mokhtari & Reichard, 2001), in which strategy statements are reduced from 30 to 15. Cronbach's alpha internal consistency coefficient for the 15-item MARSI-R scale is reported to be α= 0.85. In Mokhtari and Sheorey (2001), the total sample reliability score was found to be α= 0.85.

To ensure the reliability of the questionnaire in the Iranian context, Cronbach's alpha measure was applied and the result was found to be α =0.81, indicating that the scale is fairly reliable in this context. Concerning the validity of the revised version of MARSI, although Mokhtari et al. (2018) reported the scale to be a valid one for the intended purpose, the researchers opted for the re-validation of the scale in the context of the present study. On the basis of the revalidation results discussed in detail later in the preliminary analyses part of this manuscript, both the convergent and divergent validity of the questionnaire were confirmed.

TOEFL Reading Comprehension Sample Test

As a measure of the reading comprehension proficiency of the participants, the reading comprehension part of a sample TOEFL test extracted from The Longman Complete Course for the TOEFL Test (Phillips, 2001) was applied. To ensure the reliability of this test, Cronbach's alpha was applied and the index turned out to be α= 0.63. Considering the fact that the sample TOEFL test was cut short and only the reading comprehension section of the test was applied in the study, the reliability index of the selected part of the sample test seemed to be acceptable. According to Salvucci et al. (1997, 115), the reliability indices between 0.50 and 0.80 are considered as moderate levels of internal consistency.

Data Collection Procedures

The questionnaires and tests were administered to 317 conveniently sampled EFL students from the universities across the three provinces of Hamedan, Tehran, and Kermanshah. Considering the practicality concerns, the participants were sampled through a nonrandom convenience sampling procedure and were expected to take CTAS, Test-Wiseness, MARSI-Revised, and the Reading Comprehension Test in their online class hours and/or their free time. It is worth mentioning that at the time these questionnaires were administered all university classes were held online because of the Covid-19 pandemic, therefore there was no way but to collect the required data through online administration of the measures. All questionnaires were made available to the participants at once though it took almost two sessions for the researchers to administer the scales and collect the data. Few participants filled out the scales after the two sessions in their free time and emailed them to the researchers. The data collection lasted from February 2021 to May 2021. The administration of questionnaires was through e-mail correspondence or virtual space applications like Telegram and Instagram. The obtained data were fed into AMOS statistical package and different sets of statistical analyses were carried out on the data.

Results

The statistical analysis of the obtained data was carried out at two levels. Prior to the conduct of the main analyses to address the research question, a set of preliminary analyses including descriptive statistical analyses, data distribution normality test, and Pearson product-moment correlation analyses were conducted. Next, at the main phase of statistical analyses multiple regression and Structural Equation Modeling (SEM) procedures were employed to answer the research question. To run SEM, AMOS statistical package (version 22) was applied.

Preliminary Analyses

Prior to the conduct of inferential statistical analyses and in order to develop a brief and clear image of the performances of the participants in the measures of study, descriptive analyses were applied to the data. Table 1 presents a summary of the results of such analyses including the mean, maximum and minimum scores in each one of the study variables.

Table1. *Descriptive Statistics of Variables of the Study*

		RC	TW	CTAS	MARSI
N	Valid	317	317	317	317
	Missing	0	0	0	0
Mean		7.28	17.28	50.35	49.86
Median		8.00	17.00	49.00	51.00
Mode		8	16[a]	41.00	53.00
Minimum		0	3	25.00	21.00
Maximum		10	28	87.00	65.00

The normality of data distributions was checked through Skewness-Kurtosis measures. Table 2 presents the results of such measures for the entire data set. According to Kline (2011), the absolute value of Skewness should fall between -3 and +3, and the total value of Kurtosis should fall between -10 and +10 so that the collected data can be considered normal**.**

Table 2. *The Results of the Normality Tests*

	RC	TW	CTAS	MARSI
Skewness	-1.138	-.258	.459	-.695
Std. Error of Skewness	.137	.137	.137	.137
Kurtosis	1.808	-.557	-.497	.472
Std. Error of Kurtosis	.273	.273	.273	.273

As is evident above, the Skewness values turned out to be between -3 and +3 and Kurtosis values between -10 and +10 for all variables.

Furthermore, prior to testing the hypothesized model, Pearson product-moment correlation analyses were applied to the data set. According to Sheskin (2011), one of the underlying assumptions of SEM is that all relationships between variables should be linear and additive and checking Pearson product-moment correlations is one way of making sure of the linearity and degree of associations. The results of the correlations among the variables are indicated in Table 3 below.

Table 3. *Correlational Analyses*

		RC	TW	CTAS	MARSI
RC	Pearson Correlation	1	.467**	-.068	.164**
	Sig. (2-tailed)		.000	.231	.003
	N	317	317	317	317
TW	Pearson Correlation	.467**	1	-.009	.184**
	Sig. (2-tailed)	.000		.877	.001
	N	317	317	317	317
CTAS	Pearson Correlation	-.068	-.009	1	-.218**
	Sig. (2-tailed)	.231	.877		.000
	N	317	317	317	317
MARSI	Pearson Correlation	.164**	.184**	-.218**	1
	Sig. (2-tailed)	.003	.001	.000	
	N	317	317	317	317

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The results of correlational analyses indicated that cognitive test anxiety was not correlated with reading comprehension test performance ($p=0.231$ >0.05). The results also indicated that test-wiseness was positively correlated with EFL learners' reading comprehension test performance (r=.467, p<.05). Furthermore, reading strategies metacognitive awareness was positively associated with reading comprehension test performance (r=.164, p<.05). Also, the correlation analysis confirmed a negative significant relationship between cognitive test anxiety and reading strategies metacognitive awareness (r=-.218, p<.05), no significant relationship between cognitive test anxiety and test-wiseness ($p=0.877$ >0.05), and a positive strong relationship between reading strategies metacognitive awareness and test-wiseness (r=.184, p<.05).

Main Analyses

Structural Equation Modeling "encompasses two components: a) a measurement model (essentially through CFA) and b) a structural model" (Schreiber, et al., 2006, 325). In the case of present study, the measurement model depicted the relationships between CTAS (cognitive test anxiety) and MARSI (metacognitive awareness of reading strategies) and their respective indicators.

As mentioned above, CFA is a theory-driven confirmatory technique showing the theoretical relationships among the observed variables and their indicators. (Schreiber, et al., 2006). In addition, a major dimension of the CFA as a measurement model is the test of reliability and validity of the scales. CFA is also used to examine the extent of relationships and covariations (Schreiber, et al., 2006).

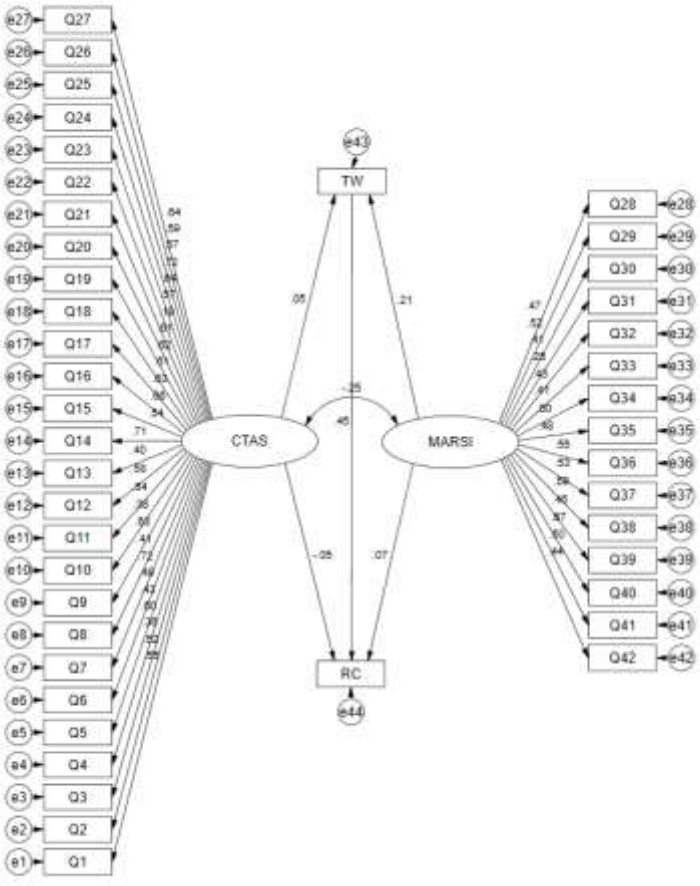
As a part of the revalidation process of the scales, the factor loadings of the items of the scales under different factors were estimated. According to Guadagnoli and Velicer (1988), factor loadings greater than 0.4 are considered stable. Therefore, the items that exhibited factor loadings over 0.4 were to be kept in the scale, and the ones with factor loadings less than 0.4 were to be eliminated. On this basis, Items Q3, Q10, Q13, Q21 from CTAS, and Q31 and Q33 from MARSI-R were removed.

The next step was to measure the composite reliability (CR) of the scales. According to Hair et al. (2014), acceptable composite reliability of a scale should exceed 0.7. The CR of MARSI-R was found to be 0.82, and for CTAS the value came up to 0.92. Therefore, the composite reliability of both scales was higher than 0.7. In addition, the convergent and divergent (discriminant) validity of the scales was estimated. Ahmad et al. (2016) maintains that convergent validity can be confirmed through AVE (average variance extracted). Accordingly, the value for AVE should be equal to or greater than 0.5.

Also, Almen et al. (2018) argued that discriminant validity could be achieved when AVE is higher than MSV (maximum shared squared variance). The following results indicate that all target indices fall within the acceptable thresholds. Therefore, both convergent and divergent validity for MARSI-R were confirmed (AVE=0.51>0.5; AVE>MSV). Also, convergent and divergent validity for CTAS were confirmed (AVE=0.58>0.5; AVE>MSV).

Figure 2 below depicts the CFA results for cognitive test anxiety and reading strategies metacognitive awareness.

Figure 2. *The Measurement Model*



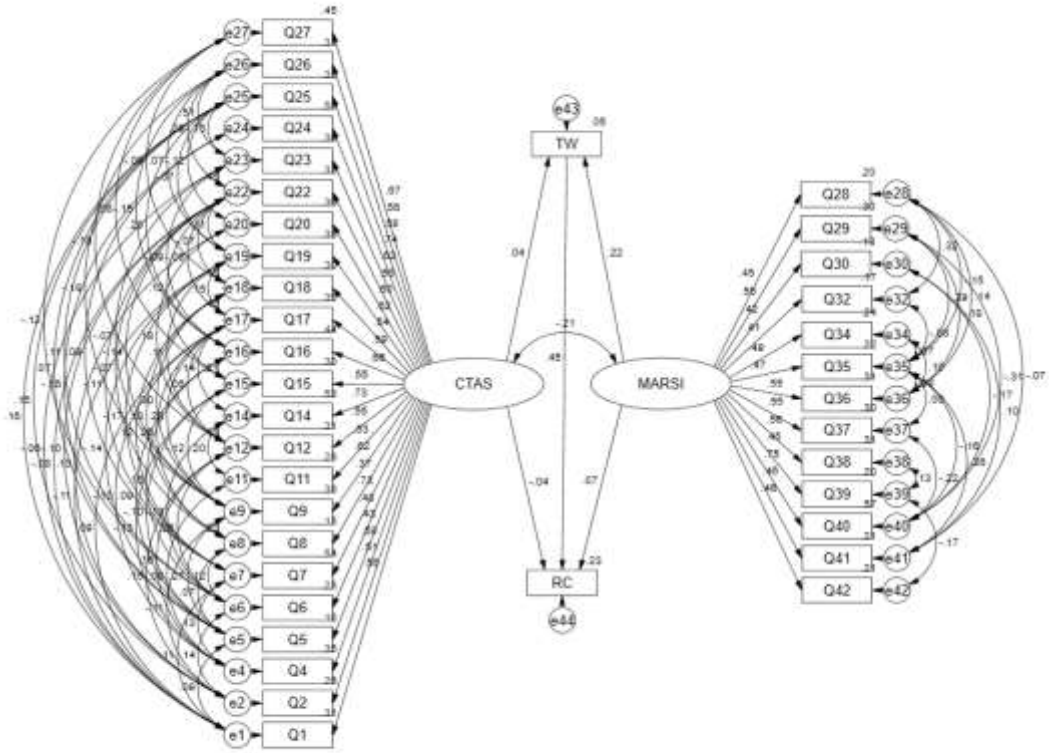
Several statistical tests are used in CFA to determine how well the model fits the data (Suhr, 2006). Table 4 indicates the fit indices of the hypothesized model of relations among the study variables.

Table 4. *The Model Fit Indices of the Hypothesized Model*

Model	CMIN/DF	RMSEA	GFI	CFI	PNFI
Default model	2.273	.063	.753	.748	.595
Saturated model		.123	1.000	1.000	.000
Independence model	5.789		.309	.000	.000
Acceptable fit	<2	<0.05	>0.90	>0.90	>0.50

As is indicated in Table 4, the fit indices including CMIN/DF (2.273>2), RMSEA (.063>0.05), GFI (.753<0.90), CFI (.748<0.90), and PNFI (.595>0.5) were either unacceptable or barely acceptable. Therefore, some modifications like double-checking the satisfaction of assumptions (as is suggested in Savalei, 2020) and deleting items with poor factor loadings (Guadagnoli &Velicer, 1988) were applied to the baseline hypothetical model resulting in the modified model shown in Figure 3. The model fit indices of the modified model were tested and checked and are presented in Table 5.

Figure 3. *The Modified Structural Model*



As shown below in Table 5, the model fit indices significantly improved after the modifications. All aforementioned fit indices including CMIN/DF (1.21<2 or 3), RMSEA (0.026<0.05), GFI (0.902>0.90), CFI (0.970 >0.90), and PNFI (0.694>0.5) lied in the acceptable threshold level and on this basis the modified model was confirmed to have an acceptable fit to the data.

Table 5. *The Model Fit Indices of the Modified Model*

Model	CMIN/DF	RMSEA	GFI	CFI	PNFI
Default model	1.217	.026	.902	.970	.694
Saturated model		.136	1.000	1.000	.000
Independence model	6.852		.310	.000	.000
Acceptable fit	<2	<0.05	>0.90	>0.90	>0.50

Figure 3 also depicts the structural model of relations among the latent variables (Schreiber et al., 2006). The directional paths in the model indicate the structural relations among the variables. In order to check the significance of these relationships, Critical Ratios needed to be considered (Byrne, 2009). It is indicated that "at 0.05 probability level, the test statistic needs to be > ±1.96 before the hypothesis postulating that the estimate equals 0.00 can be rejected." (Byrne, 2009, 68)

Table 6. *Amos Text Outputs for the Modified Model*

Path	Unstandardized Estimate	Standardized Estimate	S. E	C.R	P	Status
RC←CTAS	-0.141	-0.041	0.183	-0.771	0.441	Not significant
RC←TW	0.160	0.452	0.018	8.884	***	Positively significant
RC←MARSI	0.071	0.202	0.161	1.254	0.210	Not significant
MARSI←→CTAS	-0.068	-0.207	0.023	-2.911	0.004	Negatively significant
TW←CTAS	0.797	0.082	0.596	1.338	0.181	Not significant
TW←MARSI	1.752	0.217	0.533	3.286	0.001	Positively significant

As Table 6 indicates, the relationships between cognitive test anxiety and reading comprehension test performance ($p=0.441$ >0.05), reading strategies metacognitive awareness and reading comprehension test performance ($p=0.210$ >0.05), and cognitive test anxiety and test-wiseness ($p=0.181$ >0.05) were not significant. On the other hand, significant positive relationships between test-wiseness and reading comprehension test performance (*C. R= 8.884>1.96, p*<.05) and reading strategies metacognitive awareness and test-wiseness (*C. R= 3.286>1.96, p*<.05) were found. Also, a significant negative relationship was found between cognitive test anxiety and reading strategies metacognitive awareness (*C. R= -2.911>1.96, p*<.05). This relationship has been shown as a curved two-sided arrow between CTA and MARSI to indicate their correlation in Figure 3.

Discussion

The study investigated the model of interrelationships among test anxiety, test-wiseness, reading strategies metacognitive awareness, and reading comprehension test performance. The preliminary bivariate correlational analyses conducted to see if there was a strong relationship between EFL learners' test anxiety and reading comprehension test performance showed no such association between the variables. Confirming the findings of studies like Bensoussan (2012), Birjandi and Alemi (2010), Eum and Rice (2011), Javanbakht and Hadian (2014), Salehi and Marefat (2014), Silaj et al. (2021), and Zacoletti et al. (2020), this piece of results confirms the test anxiety as one of the main construct irrelevant sources of test performance variation. On the other hand, Chapell et al. (2005) indicated that test anxiety was negatively related to reading comprehension in female students and not related to the reading

comprehension of male test-takers. On the basis of the verified moderating effect of gender on the type of relationship between the studied variables in Chapell et al. (2005), it seems justified to assume that the gender of the participants of the current study might have also moderated the effect of test anxiety on reading comprehension test performance.

On the other hand, the analyses verified the relationship between test-wiseness and reading comprehension. This association seems to be justified on the grounds that according to Cohen (2013) test-wiseness is one of the three categories of strategic competence. Given that communicative language ability, a subcomponent of which is strategic competence (Bachman, 1990, Bachman & Palmer, 1996 among others), is the main targeted construct to affect language test performance, test-wiseness strategies can be elevated as a part of communicative language ability on the basis of this rationale. Similar to the findings of the present study in this concern, quite frequent studies have also verified a positive relationship between test-wiseness and reading comprehension test performance. They have also confirmed that test-wiseness is a subcategory of test-taking strategies that can be responsible for variations in students' reading test scores (e.g., Cohen, 2013; Ferrier et al., 2011; Nourdad et al., 2014; Wu & Stone, 2015).

On the other hand, and from a contrasting perspective, researchers also maintain that test-wiseness as a construct-irrelevant factor may negatively help test takers perform better in their reading comprehension tests. Ferrier et al. (2011) for example contended that test-wiseness is an influential construct-irrelevant factor that may explain variability in achievement test scores. Adopting a similar position in this concern, Cohen (2006) maintains that the positive effect of test-wiseness should be controlled so that the test takers' test scores do not erroneously reflect their real reading skills. Hence, from a practical and less educationally welcome perspective, Zhang (2001, 2004) and Macaro (2001) suggest that test-wiseness training may offer examinees some opportunities for getting better scores without using the reading comprehension strategies or their knowledge to make meaning.

This study also explored the relationships among reading strategies metacognitive awareness, test anxiety, and reading comprehension test performance. Cohen (2013) includes metacognitive strategies as a part of strategic competence and Bachman and Palmer (1996) put strategic competence at the center of their language use and language test performance model (p.63) claiming that it closely interacts with language knowledge, topical knowledge, affect and characteristics of language use or language test task environment. On such bases, the relations among reading strategies metacognitive awareness, test anxiety, and reading comprehension were quite expected prior to analyses, however, the findings were minimally different from the expectations. Bivariate correlational analyses indicated no relationships while the structural equation modeling confirmed a positive relationship between the metacognitive awareness of reading strategies and reading comprehension This difference may be justified on the grounds that in the former the correlation between the two variables was considered while in the latter according to Schreiber et al. (2006), a direct path relation between the two is shown. According to Wright (1921), path analysis as a part of SEM is a method of splitting correlations into different components that are themselves interrelated and may affect the direct effects. In other words, path coefficient analysis permits the separation of the direct

effects through other related characteristics by partitioning the correlation coefficient, Therefore, in some cases, the path relations found in a model may be different from the associations found by correlational analysis. Such positive direct path relations between metacognitive awareness of reading strategies and language performance are confirmed in the literature (e.g., Keshavarz & Assar, 2009; Nam & Page, 2014; Veenman et al., 2002; Zhang et al., 2014). Sheoray and Mokhtari (2001), Zhang (2002), and Zhang and Wu (2009) for example verified a positive association between reading strategies metacognitive awareness and reading comprehension test performance.

The correlational analyses and the final model also addressed the relationship between students' test anxiety and reading metacognitive awareness. The results indicated that there was a negative correlation between test anxiety and reading metacognitive awareness, and the path relation was two-sided. This means that students with higher levels of reading strategies metacognitive awareness may experience lower test anxiety, and students who are more test-anxious are more likely to be metacognitively aware. Such a finding is also reflected in Silaj et al. (2021), Spada (2006), Veeman et al. (2002). These studies confirmed that there is a negative correlation between reading strategies metacognitive awareness and test anxiety. Contrastingly, Ghonsooly and Loghmany (2012) argued that there was no significant relationship between test-takers' test anxiety and reading strategies metacognitive awareness.

The relation pattern between test anxiety and test-wiseness was also explored and the results did not confirm a significantly strong relationships between test anxiety and test-wiseness. On the basis of the obtained results that are mapped against Bachman and Palmer's (1996) model of language use, it could be argued that having higher levels of test anxiety may not necessarily lead to the test takers' enhanced use of test-wiseness strategies and their ultimate more desirable test performance.

In addition, and on the basis of research findings (e.g., Cohen, 2013, Wahlstrom & Boersma , 1968; Wu & Stone, 2015), it may be justified to consider test-wiseness as a potential effective factor in showing better performance. This idea is confirmed in the current study where test-wiseness was found to be positively related to reading comprehension test performance.

On the other hand, it could be theoretically hypothesized that lower levels of test anxiety may contribute to enhanced use of test-wiseness strategies leading to better performance. Contrary to the researchers' expectations, the current study results did not confirm this relationship. Meanwhile, to the best of knowledge and effort of the researchers, no study was found to examine the relationship between test-wiseness and test anxiety, and the idea is left open to further inquiries.

Concerning the relationship between metacognitive awareness of reading strategies and test-wiseness, studies were rarely found to examine the relationship between the variables. Still, fundamentally two different points of view may be taken regarding the test-wiseness and metacognitive awareness. The first viewpoint considers test-wiseness as a main sub-category of strategic competence (Cohen, 2013), on the other hand, the second approach considers test-wiseness as a cognitive test-taking strategy (e.g., Benson, 1988; Rogers and Bateson, 1991) and as a subgroup of language learner strategies including cognitive, metacognitive, affective, and social strategies.

The findings of this study showed a significant positive relationship between test-wiseness as a cognitive test-taking strategy and metacognitive awareness. Similarly, Cohen (2013) believes that cognitive and metacognitive strategy use and awareness are positively related. Phakiti (2003), who explored the relationships between cognitive, metacognitive awareness of reading strategies and test performance, supported the idea and suggested that cognitive and metacognitive strategies and awareness are associated with each other and also with reading comprehension test performance.

The verified model of the present study supports the findings of Silaj et al. (2021), who indicated that metacognitive awareness of reading strategies could be related to test anxiety. Furthermore, they showed that test anxiety could lead to poorer metacognitive awareness. The correlational analyses results obtained in the current study verified the same point. This result is also confirmed in Spada et al. (2006) and Zhang et al. (2014) that showed that test anxiety can be negatively associated with metacognitive awareness of reading strategies. The results indicate that the more students become metacognitively aware of their reading strategies, they will be less anxious and the more anxious they become, the less metacognitively aware of their reading strategies they will be.

Finally, the verified model in this study demonstrated a positive relationship between metacognitive awareness of reading strategies and test-wiseness, which was by itself positively correlated with reading comprehension test performance. Cohen (2006) and Ferrier et al. (2011) among others have also reported similar findings as well. Furthermore, a negative correlation was found between cognitive test anxiety and reading metacognitive awareness. On the other hand, no associations were found among cognitive test anxiety, test-wiseness, and reading comprehension test performance. No significant relationships were verified between reading strategies metacognitive awareness and reading comprehension test performance either.

Conclusion

The study explored the relationship between few cognitive, metacognitive, and psychological factors and reading comprehension test performance. To this aim, the relations among test-wisneness, test anxiety, metacognitive awareness, and Iranian EFL learners' reading comprehension test performance were tested. Furthermore, attempts were made to figure out a path analytic model of interrelations among the factors in Iranian language learning contexts.

The results verified a pair of significant positive path relations including one between test-wiseness and reading metacognitive awareness, and the other between test-wiseness and reading comprehension test performance. Also, a significant negative correlation was confirmed between reading strategies metacognitive awareness and cognitive test anxiety. Three non-significant paths were also figured out including those between metacognitive awareness of reading strategies and reading comprehension, cognitive test anxiety and reading comprehension, and cognitive test anxiety and test-wiseness.

Implications for theory and recommendations for practice

In theoretical terms, the findings of the present study are expected to make the educational theorists, practitioners, test developers and language teachers among many others even further

conscious of the impacts of test-wiseness on the test-takers' test-performance. Such heightened awareness might have some practical implications. For a group of educationalists this means that test-wiseness training courses need to be given credit as they help students make progress (Diamond & Evans, 1972). On the other hand, others might further emphasize that test-wiseness is a way to enhance test performance without the test takers' needed mastery of the given knowledge and/or ability, it brings about invalidity concerns of the tests (Cohen, 2006), hence, the effect of test-wiseness on tests should be controlled by developing tests that can't be answered by just being test-wise. A logical mid-way in this duality seems to be the recognition of test-wiseness strategies knowledge as a contributory factor for getting better test results in highly competitive norm referenced speed test contexts only. This might imply that such test wises strategies need to incorporated into educational materials and a proportionate level of peripheral attention needs to be given to their instruction in educational courses. On the other hand, the test developers need to reconsider the attested relations between the test-wiseness strategies and the given cognitive and psychological variables and the test takers test performances in an attempt to so design and develop the tests that maximally nullify the attested negative impact.

The findings of the study might also be practically helpful for the learners. As is mentioned before, two significant positive and negative correlations were found between metacognitive awareness and test-wiseness and between cognitive test anxiety and metacognitive awareness respectively. This might mean that through learning how to be more metacognitively aware of their learning process, the students may become low test-anxious and more test-wise, which by itself may lead to a better test performance, particularly in reading comprehension.

List of abbreviations

EFL: English as a Foreign Language

AMOS: Analysis of a Moment Structures

GPA: Grade Point Average

M.A.: Master of Arts

B.A.: Bachelor of Arts

CTAS: Cognitive Test Anxiety Scale

TW: Test Wiseness

MARSI-R: Metacognitive Awareness of Reading Strategy Inventory-Revised

TOEFL: Test of English as Foreign Language

SEM: Structural Equation Modeling

CFA: Confirmatory Factorial Analysis

CR: Composite Reliability

AVE: Average Variance Extracted

MSV: Maximum Shared Variance

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