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A Cross-Cultural Evaluation of the Psychometric Properties of an Emotional Intelligence Scale in the Academia of Pakistan

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Abstract- Purpose: This study tested the emotional intelligence (EI) scale's psychometric properties, adapted for undergraduate students in Pakistan. This scale comprised of five dimensions: (i) self-awareness, (ii) self-regulation, (iii) motivation, (iv) empathy, and (v) social skills. Methods: The scale was used to collect the data from 305 undergraduate students of social sciences, physical sciences, and business studies in Pakistani universities. SmartPLS 3.2.2 was used to conduct confirmatory factor analysis (CFA). The items, having loading values than standard, were eliminated. The reliability, internal consistency, and validity of the scale were tested by performing appropriate statistical tests. Cronbach's alpha, roh_A, and composite reliability analysis were performed to test the reliability and internal consistency. As the adapted scale comprised reflective and formative measures, both types of measures were tested accordingly. The convergent and discriminant validity of the reflective measures was tested through average variance extracted (AVE) and heterotrait-monotrait (*HTMT*) analysis. Simultaneously, redundancy (r) analysis, VIF (for collinearity), indicator weights, and statistical significance were applied to test the formative measures' validity and reliability. Results and conclusion: The analysis results indicated all reflective and formative measures were reliable and valid; therefore, suitable for measuring the emotional intelligence of undergraduate students in Pakistan.

Keywords: Emotional Intelligence, Psychometrics, Reliability, Validity, Undergraduates, University Students, Pakistan.

I. INTRODUCTION

Emotional intelligence (EI) is one of the critical research areas in education, especially in educational psychology. A perusal of literature indicates the positive association of EI with quality learning outcomes and learning success (Preeti, 2013; Zhoc, Chung, & King, 2018). EI is deemed to be essential for performance, retention, persistence, experience, learning, and achievement (Brackett & Salovey, 2006; Grewal, Brackett, & Salovey, 2006; Prafitriyani, Magfirah, Amir, Irmawati, & Umanailo, 2019; Smith, Profetto-McGrath, & Cummings, 2009; Vandervoort, 2006). EI is necessary and helpful not only for students' learning, academic efficacy, and achievement but also for their socialization with self-efficacy (Majeski, Stover, Valais, & Ronch, 2017; Mouton, Hansenne, Delcour, & Cloes, 2013; Nasir & Masrur, 2010). The university students with good emotional intelligence appeared to have low academic-related anxieties such as information-seeking anxiety, library anxiety, statistics anxiety, and test anxiety (Jan & Anwar, 2019).

Emotional intelligence (EI) is a psychological concept (Lee, Kim, & Park, 2017). Researchers have studied EI in relation to the concepts such as developing critical thinking (Kaya, Şenyuva, & Bodur, 2017), students' eudemonia (well-being, life satisfaction, and burnout) over the time (Carvalho, Guerrero, & Chambel, 2018), and successful learning process (Mitrović Veljković et al., 2020). Zeidner and Matthews (2017), have also emphasized the EI of gifted and high-ability students. Besides, EI has been referred to as a summative value of self-motivation, and awareness of others' emotions, social skills (Boyatzis, Goleman, & Rhee, 2000; Goleman, 1998b), and complimentary use of emotions (Jordan & Troth, 2002). The elements of EI, highlighted in Goleman's model, include self-awareness (SA), self-regulation (SR), motivation (M), empathy (E), and social skills (SS) (Cherniss & Goleman, 2001); (Goleman, 1998). The term "emotional intelligence" (EI) was initially mentioned in the study of Salovey and Mayer (1990). According to them EI constitutes of four elements: (i) the recognition of emotions on a non-verbal basis, (ii) the use of emotions which directly associated with cognitive thought, (iii) the use of emotions which directly associated with cognitive thought, and (iv) the perception of knowledge that emotions transmit and the behavior that emotions produce and control the emotions for one's personal gain and for the greater good. Later, their theory is extended by the scholars to describe EI as abilities for deciding about self-perception, perceiving others, and dealing with them professionally (R Bar-On, 2007; Cherry, Fletcher, Berridge, & O'Sullivan, 2018; Faltas, 2017; Qualter, Gardner, & Whiteley, 2007).

The theory of Goleman (2007) and Faltas (2017) explains the EI as a collection of intertwined actions resulting from emotional and social competencies. Goleman (2007) explain that EI has five dimensions: (i) SA, (ii) SR, (iii) M, (iv) E, and (v) SS. Self-awareness refers to recognizing one's self at any specific moment and realizing the effect of moods on others. Self-regulation means managing or redirecting one's impulses and predicting repercussions before acting on such impulse. Inspiration is the emotional influence to accomplish objectives and pleasure, appreciate the learning experiences, and preserve in the face of obstacles. Empathy denotes the detection of emotion of others; whereas, social skills attribute to maintaining interactions with people either for motivating them or prompting expected replies from them.

Mayer, Caruso, and Salovey (2016) and Saltz et al. (2004) have investigated the role of EI in an individual's thinking and decision making processes. In this regard, Mayer et al. (2016) presented a four-branch skill model of EI that integrates: (i) emotional interpretation – the capability to recognize emotions in the non-verbal communication, (ii) usage of emotions to promote reasoning and cognition, (iii) knowing emotions to identify, differentiate, and interpret thoughts and awareness of emotional patterns and their effects over time, and (iv) controlling emotions to encompass human identity and the way emotions are controlled (Craig et al., 2019; Faltas, 2017; Mayer et al., 2016; Saltz et al., 2004). This four branch-model of EI, ordered from emotional awareness through to action preparation, correlates how well the skill works into the individual's knowledge-gathering, general attitude, strategies, objectives, etc. In addition, each branch of this model requires specialized skills developed on more basic skills (Craig et al., 2019; Faltas, 2017; Mayer et al., 2016; Saltz et al., 2004).

The neuropsychological studies of Barbey, Colom, and Grafman (2014) explains that the same cognitive mechanisms and frameworks regulate the emotional and cognitive (or general) intelligence. In other words, EI and cognitive ability co-exist in actions and brain (Craig et al., 2019). The review of literature shows that there were only a few studies on EI along with its sub-constructs, i.e., self-awareness (SA), self-regulation (SR), inspiration (M), empathy (E), and social skills (SS).

Emotional Intelligence Scales

The published studies show that the researchers generally measure the emotional intelligence through performance-oriented and self-assessment methods. The literature shows numerous emotional intelligence scales (Jan & Anwar, 2019). Researchers like Reuvan Bar-On, Handley, and Fund (2006); Brackett and Salovey (2006); Schutte et al. (1998) have categorized the scales and statistical tests suitable for measuring EI. Although the reliability and validity of these EI scales persist functionally, but it is still debatable. A study conducted by the Consortium for Research on EI in Organizations (CREIO) has introduced a few suitable and reliable scales acknowledged through their citations in the publish literature (Jan & Anwar, 2019). The following section briefly discusses a few commendable EI scales mentioned in the relevant literature.

i. Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)

Mayer, Salovey, and Caruso (2002), designed the Mayer-Salovey-Caruso EI Test abbreviated as the MSCEIT. This test measures the overall EI meaning and the sub-scale values for emotional perception, emotional thinking, emotional comprehension, and emotion control. The previous version of this measure was the Multifactor EI Scale (MEIS) (Mayer et al., 2002). The MSCEIT was designed based on the four-branch model developed by Mayer and Salovey (1997). This scale assesses each branch through two sub-scales namely: perceived emotions, and using emotions to facilitate thoughts. The first branch, perceived emotions, is assessed through: (i) faces that are requested to recognize emotions expressed by facial gesture, and (ii) photographs through which participants are requested to emotions identification (Mayer et al., 2002). The second branch, utilizing sensations to enable thoughts, is assessed through: (i) the sensations for which participants must compare feeling emotions such as light, color, and temperature with other tangible stimuli, and (ii) identification of emotions that assist participants' type of thinking. The third branch, thoughtful sentiments, is assessed by: (i) modifications that assess the capacity of a person to consider one's emotional sensitivity under various situations and how his/her emotional condition turns into another, and (ii) blends for which the participants require all the sensations that are elaborate in dynamic effective states to define. The fourth branch, organizing the emotions, is assessed by: (i) emotional management in which hypothetical situations are modeled to respondents to know how they can sustain or alter their thoughts, and (ii) emotional association that is to know how the participants handle others' though to achieve their desired results by exploiting their emotions. The test consisted of 141 items on a five-point Likert scale from 1= not at all, to 5= very much effective. The MSCEIT was a valid and reliable scale (Jan & Anwar, 2019).

ii. Bar-On's Emotional Quotient Inventory (EQ-I)

Reuvan Bar-On et al. (2006), have used the term 'emotional quotient' instead of 'emtional intelligence' in their study. However, both terms are used interchangeably in the educational psychology works. Emotional quotient inventory, built upon the Bar-On's conceptual model of emotional-social intelligence (1997), assessed the emotional and social intelligence. It was a self-reporting measure that evaluated emotional quotient, emotional intelligence and social intelligence (Reuvan Bar-On et al., 2006). Bar-On's emotional quotient inventory measures overall as well as subscale of five elements. This EQ-I elements are composite such as interpersonal, intrapersonal, adaptability, mood, stress and general management. This scale consisted of 133 statements. The scale type was 5-point Likert. The range of responses was from one to five, 1 is equal to very seldom to 5 1 is equal to very often. This scale was taken round about 40-Minitus for a participant to fill the EQ-I on average (Reuvan Bar-On et al., 2006).

iii. Schutte's Emotional Intelligence Scale

Schutte's EI scale was designed for measuring EI. It is referred to by different names in the published literatures, e.g., self-reporting emotional intelligence measureEI scale, evaluating emotions scale, and Schutte's EI scale (Schutte, Malouff, & Bhullar, 2009). This self-reporting scale consisted of 33 items measured on 5-point Likert scale type. It was ranging from 1 to 5, 1= strongly disagree while the 5= strongly agree. All items in this scale cover the four branches of Salovey and Mayer (1990) theoretical model of EI (Schutte et al., 1998). The results of the Schutte's self-reporting scale are based on score ranging from 33 to 165 for lowest to highest EI respectively.

iv. Emotional and Social Competence Inventory (ESCI) or Emotional Competence Inventory (ECI)

The ECI is a 360-degree instrument intended to measure individuals' emotional and social abilities through self-report and others. This scale is based on Daniel Goleman's emotional and social competencies model (Goleman, 1998a). This self-assessment questionnaire (SAQ), designed in 1998, is based on the generic competencies (Boyatzis et al., 2000). A sample of 596 participants, including managers and salespeople from several industrial organizations and the graduate students from various academic disciplines, was evaluated for the first edition of ECI. Later, Boyatzis and Goleman used the vision method with a testing team at Hay/McBer to develop the new edition of their scale called ECI-2.0. This scale has an approximate average internal consistence score of 0.78 and 0.63 for assessment of others and self-reporting, respectively (Gowing, 2001). ECI-2.0 comprises of 110 statements that assesses 18 competencies assembled in four clusters: self-esteem, self-control, interpersonal awareness, and management of relationships.

Theoretical Model under the Study

Emotional intelligence (EI) refers to perceiving, controlling, and evaluating emotions (Mehta & Singh, 2013). Some researchers say that it is possible to acquire and develop EI, while others believe it is an inborn trait. Salovey and Mayer (1990), in their seminal task on EI. They described EI is the part of social intelligence. This has the ability to understand the others feelings and emotions as well as one's own. This is the ability to differentiate between these emotions. This information can be used taking guidance for helping others actions and thinking. Golemen' model focuses on three personal characteristics (self-awareness, self-regulation, and motivation) and two social skills (empathy and social skills) of the individual (Golemen, 1998). Therefore, research designed the theoretical framework based on the work of (Goleman, 1998a). Figure. 1 showed the all these five factors.

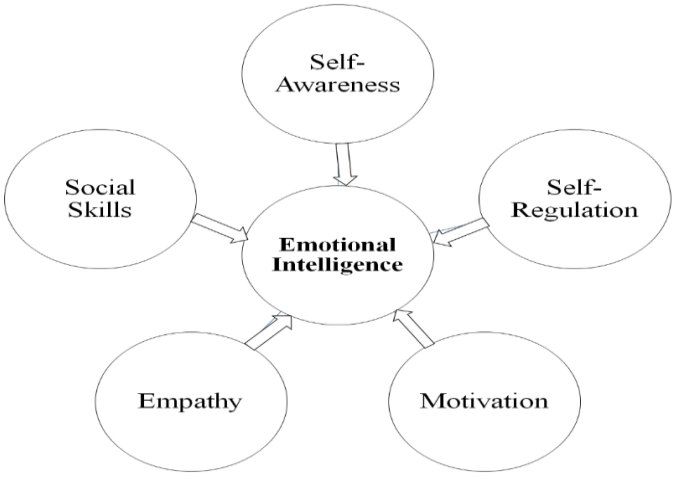

Figure 1: *Emotional intelligence constructs model.*

Self-Awareness– People with a substantial degree of emotional intelligence are generally aware of themselves. They can apprehend their feelings, therefore, do not allow their emotions to rule them. They are pretty confident, as they trust their emotions and do not allow their feelings to go out of reach. They are capable of taking an independent position at themselves as well. They clearly understand their strengths and weaknesses, and they practice in such contexts to perform better. Many researchers argue that the self-awareness is an essential aspect of emotional intelligence (Goleman, 2001; Mehta & Singh, 2013).

Self-Regulation: This is the ability to regulate feelings and emotions. Usually, people who regulate themselves neither let themselves become too frustrated nor do they overthink. Therefore, they do not make immature and reckless decisions as they think before acting. Self-regulation characteristics include humbleness, compliance with transition, honesty, and the ability to say no (Goleman, 2001; Mehta & Singh, 2013).

Motivation:Individuals with a high level of emotional intelligence are generally motivated. They are prepared to ignore immediate results for long-term progress. They are very productive, enjoy challenges, besides being very supportive of all they do (Goleman, 2001; Mehta & Singh, 2013).

Empathy: It is the ability to identify and understand the wants, needs, and viewpoints of others around you. Empathetic individuals are good at knowing others' emotions even if such feelings may not be apparent. As a result, the empathic persons are generally great at managing relations, hearing, and interacting with others. They avoid being stereotyped and judged too quickly and lead their lives in a very transparent and honest manner (Goleman, 2001; Mehta & Singh, 2013).

Social Skills: Social skills are another important indicator of high emotional intelligence. Individuals with high social skills are not only adequate in expressing themselves but they also help others succeed and shine instead of merely focusing on their own progress. They are good at resolving conflicts, solving problems, besides building and maintaining relationships. Social skills are considered as an essential component of a leader, as they enable them to connect with and manage people by using their emotional intelligence (Goleman, 2001; Mehta & Singh, 2013).

Objectives of the study

This study aims to test the psychometric properties of the emotional intelligence scale adapted for Pakistani undergraduate students. This scale covers the Goleman's (2001) five dimensional model, i.e. self-assessment (SA), self-regulation (SR), motivation (M), empathy (E), and social skills (SS). The psychometric assessment of the adapted scale is highly important for three specific reasons: (i) the statements are rephrased to adapt with the Pakistani cultural settings, (ii) the scale items have been adapted from two different scales developed by Mayer et al. (2002); Bar-On, Handley, & Fund (2006); Schutte, Malouff, & Bhullar, (2009); and Goleman (1998a), and (iii) the dimensions of EI included in this scale have been distinctly studied and have not been tested together (Craig et al., 2019; Faltas, 2017; Mayer et al., 2016; Saltz et al., 2004). The objective is to test the psychometric properties, i.e. reliability and validity, of the adapted scale. This study, therefore, investigates the internal consistency, convergent validity, and discriminant validity of the scale.

II. RESEARCH METHODOLOGY

This confirmatory study inherits the assumptions of positivism. The scale under analysis was used to collect quantitative data as per survey method protocol (Arif, Iqbal, & Khalil, 2019). The survey method is considered as a reliable method for collecting quantitative data in an effective and efficient manner (Rasool, Wang, Zhang, & Samma, 2020).

The Emotional Intelligence (EI) Scale

The scale under analysis measured EI on five dimensions: self-awareness (SA), self-regulation (SR), motivation (M), empathy (E), and social skills (SS). The scale, in the form of questionnaire, was divided into two sections. The first section introduced the study, its purpose, statement of research ethics, respondents' privacy and anonymity, and the instructions for filling the questionnaire, besides gathering the respondents' demographics. Whereas, the second section comprised of total 25 items to gauge the EI variable and was sub-divided into five sub-sections for each of the five dimensions of EI. These subsections included 4 items for SA, 4 items for SR, 6 items for M, 7 items for E, and 4 items for SS. All

items in the second section gathered the response on the 7-point Likert scale. These responses were ranging from one to seven, from strongly disagree to strongly agree.

To ensure the face validity and content validity of the scale, a pilot study was conducted. That study analyzed the data collected from 80 undergraduate students by applying exploratory factor analysis (EFA) using SPSS. The respondents were asked to mark any statement they cannot understand. The marked statements were rephrased for clarity. The results of pilot study were used to reduce (the items with insignificant factor loading) or modify (the items with significant but lower factor loading) in the scale. The data and the pilot study findings are not incorporated in this study. The scale was used for data collection after necessary modifications in the light of pilot study results.

Variable Measures

Self-Awareness

The items of EI (SA) were adapted and modified from the work of Mehta and Singh (2013) and C. H. Zhoc (2015). A total of four items were made finally for emotional intelligence (SA). This scale used seven point Likert Type. The range of the responses were one to seven. The responses was closed ended 1= strongly disagree while the 7= strongly agree. Sample of statements were incorporated such as "I can identify my emotions in different situations", and "I believe that emotions play an essential role in everyday life events". The alpha for EI was 0.706 (see Table 3). Since this construct met the standard index of 0.70, it is appropriate for this study.

Self-regulation

The EI items (SR) were adapted and modified from the work of Mehta and Singh (2013) and C. H. Zhoc (2015). A total of four items were made finally for emotional intelligence (SR). This scale used seven point Likert Type. The range of the responses were one to seven. The responses was closed ended 1= strongly disagree while the 7= strongly agree. Sample of statements were incorporated such as "I can talk to someone if I am very upset" and "I am able to control my overthinking". The alpha for emotional intelligence was 0.703 (see Table 3). This construct was found appropriate for this study as it met the standard index 0.70.

Motivation

The EI scale (M) were adapted and modified from the work of Mehta and Singh (2013) and C. H. Zhoc (2015). A total of six items were made finally for emotional intelligence (M). This scale used seven point Likert Type. The range of the responses were one to seven. The responses was closed ended 1= strongly disagree while the 7= strongly agree. Sample of statements were incorporated such as "I pursue goals beyond what's required or expected of me" and "I learn to do better next time". The alpha of emotional intelligence was 0.72 (see Table 3). This construct met the standard index 0.70 and is appropriate for this study.

Empathy

The items of EI (E) were adapted and modified from the work of Mehta and Singh (2013) and C. H. Zhoc (2015). A total of seven items were made finally for emotional intelligence (E). This scale used seven point Likert Type. The range of the responses were one to seven. The responses was closed ended 1= strongly disagree while the 7= strongly agree. Sample of statements were incorporated such as "I can be supportive when giving bad news to others", "My friends can trust me with their secrets". The alpha for emotional intelligence was 0.848 (see Table 3). This construct was meeting the standard index, which is 0.70, and it is considered adequate for the construct under study.

Social Skills

The EI items (SS) were adapted and modified from the work of C. H. Zhoc (2015). A total of four items were made finally for emotional intelligence (SS). This scale used seven point Likert Type. The range of the responses were one to seven. The responses was closed ended 1= strongly disagree while the 7= strongly agree. Sample of statements were incorporated such as "I am good at motivating others" and "It is easy for me to make friends". The alpha of emotional intelligence was 0.706 (see Table 3). This construct met the standard index 0.70 and is appropriate for this study.

Population and Sample of the study

This study tests the psychometric properties of the adapted scale based on the responses of the undergraduate students in Pakistan. In Pakistan, the higher education institutions are broadly categorized as public sector and private sector universities. Both categories of universities exhibit different cultures, therefore, are considered as natural stratum for data collection. Besides, the objectives of this study clearly state it to be focused on the undergraduate students only and do not impose any further conditions. Based on these reasons, this study used the stratified random sampling technique. This technique also strengthen the results of this study as it is not only an unbiased technique but it also allows the researcher to divide the population into small groups based on respondents' shared attributes.

The data was collected from six universities, three from either stratum, near Lahore, Pakistan. Lahore is a historical city and a cultural hub of Pakistan (Sheikh, 2008), which has been declared as the "Creative City of Literature" by UNESCO in 2020 (UNESCO, 2020). This city being the largest metropolitan of the country hosts 33 universities, therefore, is naturally a dream destination for the students from all corners of the country. Based on such facts, the sample of university students in Lahore can be considered as the true representatives of the population.

A total of 1,500 printed copies of the questionnaire were floated, a return rate of 20.33% was observed, as 305 usable responses were received. The demographics of the respondents are reported in Table 1.

Table 1. Demographics of the sample

Measure	**Items**	**Frequency (n)**	**Percentage (%)**
Gender	Male	173	56.7
	Female	132	43.3
	Total	305	100.0
Background	Rural	119	39.0
	Urban	186	61.0
	Total	305	100.0
Age	Less than 22	232	76.1
	22-30	73	23.9
	Total	305	100.0
Sector	Public	99	23.9
	Private	206	76.1
	Total	305	100.0
Semester	Three	46	15.1
	Four	36	11.8
	Five	116	38.0
	Six	44	14.4
	Seven	44	14.4
	Eight	19	6.2
	Total	305	100.0
Field of Study	Social Science Education	141	46.2
	Business Education	67	22.0
	Physical Sciences	97	31.8
	Total	305	100.0

III. DATA ANALYSIS

We applied exploratory factor analysis and confirmatory factor analysis using SnartPLS 3.2.2 statistical software. SmartPLS is hassle free software to analyze the data. This software is more statistically efficient that other software Hair Jr, Sarstedt, Ringle, & Gudergan, 2017. SmartPLS is very easy to handle and use for both expert as well as beginners. The detail discussion has presented below.

Preliminary considerations Using Smart-PLS-SEM

Sample size

This is a pilot study, and we used PLS-SEM, which produces solutions of limited sample sizes and model contains various constructs and a large number of items. (Fornell & Bookstein, 1982; Hair Jr, Sarstedt, Ringle, & Gudergan, 2017; Willaby, Costa, Burns, MacCann, & Roberts, 2015). Reinartz, Haenlein, and Henseler (2009) PLS-SEM demonstrate greater robustness with limited data set (Sarstedt, Hair, Ringle,

Thiele, & Gudergan, 2016). The primary justifications for using PLS-SEM are; it helps handle non-normal data with a limited number of respondents, combining with other reasons for choosing PLS-SEM.

Statistical power

Researchers benefit from the large degree of statistical power of the method when using PLS-SEM compared to CB-SEM (Hair Jr et al., 2017; Reinartz et al., 2009). Greater statistical strength indicates that PLS-SEM is more likely to recognize relationships as necessary as they are already present in the population (Sarstedt & Mooi, 2019). Therefore, Few researchers falsely assume that PLS-SEM is not effective for theoretical testing and validation (Westland, 2015). Several methodologists have supported PLS-SEM for model fit measures (Henseler, Hubona, & Ray, 2016), but while assessing these measures' appropriateness with PLS-SEMS, researchers should be cautious. (Hair, Risher, Sarstedt, & Ringle, 2019; Henseler & Sarstedt, 2013).

Assessing formative and reflective measurement models equally

PLS-SEM is the preferred approach when the theoretical model contains reflective and formative constructs (Hair et al., 2019). Formative measurement models are tested based on the following indicators: convergent validity, collinearity of the indicator, statistical significance, and indicator weight relevance (Hair Jr et al., 2017). The convergent validity for formative measurement is tested by measuring the association among the theoretical model constructs with a substitute measure of the same concept. Researchers should use PLS-SEM: where one or more formatively measured constructs are used in the path model (Hair et al., 2019). We analyzed a reflective scale on indicators of indicators loading, CA, rho_A, CR, and AVE in the confirmatory analysis, and detail has been provided in the next section factor analysis.

Factor Analysis

We began data analysis with CFA (confirmatory factor analysis) related to structural equation modeling (SEM). CFA determined discriminant and convergent validity of each construct and fitness of the overall measurement model. Measurement model fitness increased at the proposed threshold level. We used exploratory factor analysis and erased the items having low loading. We analyzed a reflective scale on CA, rho_A, CR, and AVE indicators in the confirmatory analysis. The threshold value of indicators loading 0.7 but more than .050 is also acceptable. The threshold value of CA, rho_A, and CR is 0.70, and the threshold value of AVE is 0.50. We measured all constructs based on the standard index of indicators loading, CA, rho_A, CR, and AVE, and found them reliable and valid.

Table 3 reliability reflective scales

Constructs	**Cronbach's Alpha**	**rho_A**	**Composite Reliability**	**Average Variance Extracted (AVE)**
Self-Awareness	0.706	0.746	0.817	0.533
Empathy	0.848	0.854	0.886	0.527
Self-Regulation	0.703	0.732	0.813	0.525
Social skills	0.706	0.722	0.820	0.535

We measure convergent and discriminant validity through AVE and HTMT tests. The equation of convergent validity AVE ≥ 0.50, and the threshold value of discriminant validity for conceptually related abstracts: HTMT< 0.85: further, for conceptually related abstracts: HTMT < 0.85. In table 4, we found AVE ≥ 0.50 and HTMT is significantly lower than the threshold value.

Table 4 Convergent and discriminant validity

Reflective Scales	**AVE**	**SA**	**E**	**M**
Self-Awareness	0.512			
Empathy	0.533	0.713		
Self-Regulation	0.524	0.704	0.786	
Social skills	0.636	0.651	0.788	0.375

Formative measurement

For formative measurement models, we calculate the convergent validity (redundancy analysis) $0.70 Collinearity (VIF ≥ 3-5), Potential collinearity problems when VIF ≥ 3-5 preferably indicate that VIF < 3. Statistical significance of weights p-value < 0.05. Those indicators that have non-significant weight

loadings of 0.50 or more are considered important to the subject. Table 5 shows the formative measurement analysis of redundancy, collinearity, statistical significance, and indicator weight meeting threshold value and found reliable and valid.

Table 5 redundancy (r) analysis, collinearity (VIF), indicator weights and statistical significance of social skills, and decisions

Formative Constructs	Redundancy (r)	VIF	Indicator Weights	P Values	Decision
M -> M-G	0.765	1.000	1.000	0.000	Valid

Table 6 shows the regression analysis results of five constructs of emotional intelligence. For this purpose, PLS-SEM 3.2.2 efficient software for statistics was used to analyze all constructs' relationships comprising the model (Rasool et al., 2020; Roldán & Sánchez-Franco, 2012). Results show the relationship of SA, SR, E, M, and SS with the EI scale. Table 6 and figure 2 show that SA, SR, M E, and SS have positive and significant relationship with EI (β= 0.207, $p < 0.05$, β= 0. 225, $p < 0.05$, β= 0. 283, $p < 0.05$, β= 0. 363, $p < 0.05$, β= 0. 212, $p < 0.05$ respectively), which means all the constructs have significant relationship with EI.

Table 6 direct relations

Paths	Estimations	Mean	SD	T Statistics	P Values
SA -> EI	0.207	0.206	0.013	16.026	0.000
SR -> EI	0.225	0.225	0.011	20.344	0.000
M -> EI	0.283	0.282	0.01	27.302	0.000
E -> EI	0.363	0.362	0.014	26.398	0.000
SS -> EI	0.212	0.212	0.01	20.387	0.000

Emotional intelligence output model

The coefficient of decision R^2 of 0.75, 0.50, and 0.25 is deemed substantial, moderate, and weak to be the core criteria for evaluating the structural model. Frequently, R^2 values of 0.90 and more significant are indicators of overfitting. The R^2 excluded value for the ability to SA is 0.207, the R^2 excluded value for SR is .225, the R^2 excluded for E is 0.363, and the R^2 excluded for the M is 0.283, R^2 excluded for SS is 0.212. Accordingly, the estimation of all subscales are to be found significantly correlated with the overall emotional intelligence scale.

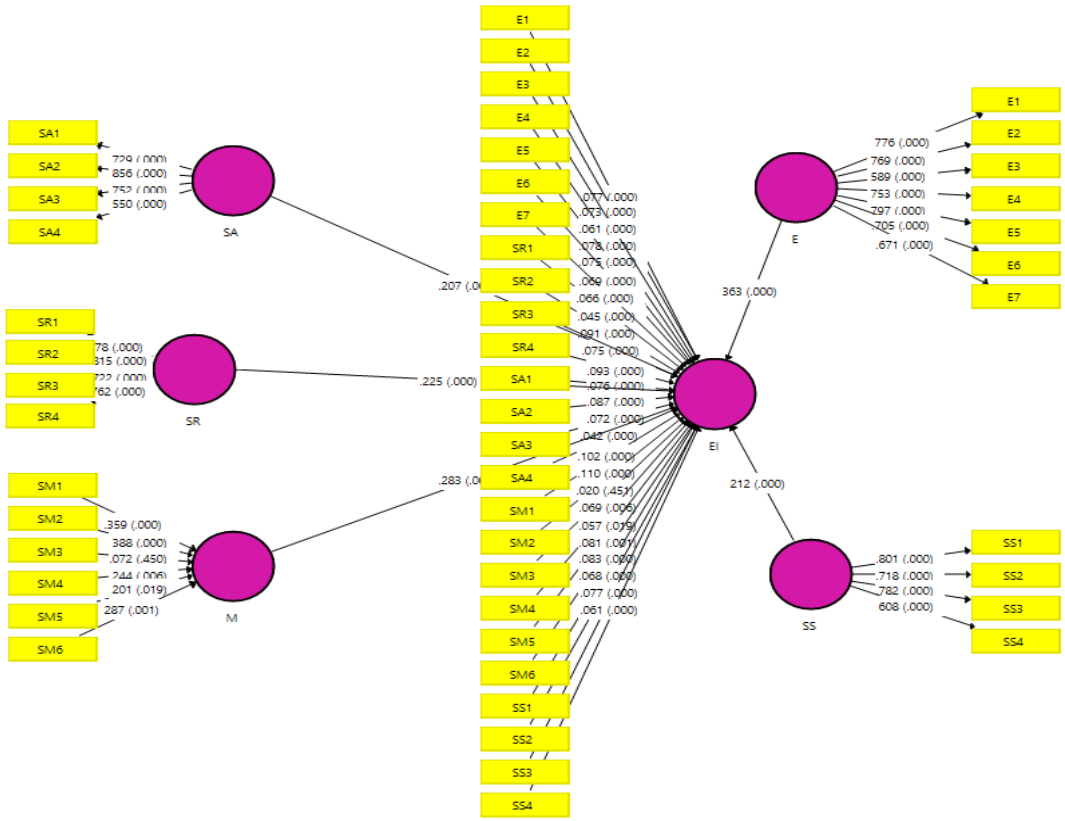

Figure 2: emotional intelligence output model

IV. Discussion and Conclusions

The emotional intelligence construct is widely investigated in the workplace at the organization. It plays a significant role in building and maintaining our relationships by using skills like SA, SM, E, M, and SS. It is a fact that research investigated more findings related to emotional intelligence; more new indicators will emerge. It leads to more accurate measurement development in the education sector. This contemporary study aims to adapt and modify an EI scale for undergraduates in Pakistan's local higher education setting.

EI scale was initiated by Mehta and Singh (2013), then adapted (Gignac, Palmer, Manocha, and Stough (2005); Siu, 2009) , and (C. H. Zhoc, 2015) separately. This study is critical because it revealed the five valid constructs of EI for student of higher education. In this process, we collect the data from the undergraduate students, and CFA applied to measure the instrument's reliability and validity in the local setting Pakistan. C. H. Zhoc (2015), also explains EI's factors in higher education in the Hong Kong university setting. Factors SA, SM, E, M, and SS were related mostly to students' classroom engagement in university education (Mehta & Singh, 2013; Schutte et al., 1998; C. H. Zhoc, 2015).
EI's theoretical framework was designed with sub-factors, including SA, SM, E, M, and SS. The construct validity results explored that the items were reduced and only six items were found valid in AOE construct. Only three items were related to M. For SA, and we found four-item valid while we have valid five items informative construct SM. However, the results show that the instrument was valid with item reductions in factor analysis and confirmed all constructs' validity through CFA. These five indicators SA, SM, E, M, and SS, will be considered in the final study by erasing the instrument's items. We used the CFA technique to measure all constructs' reliability and validity on a seven-point Likert scale made up of 24 items was finally developed. All results regarding reliability and validities have been presented in tables three, four, and five.

V. Limitations and Future Research

The emotional intelligence scale opens the assessment of the various dimensions of emotional intelligence, making it possible to study these factors' relationships in future researches. Scale seems useful to measure the factors of emotional intelligence among university students as set by this study. Social skills

will be a more useful indicator taking it as a separate indicator rather than embedded in awareness of other emotions. This contemporary study included the sample from social sciences (305 participants were selected), social sciences (141 participants were selected), business sciences (97 participants were selected), and physical sciences (67 participants were selected); future research may include medical and computer sciences samples to test the validity of the EI scale by applying CFA. We tested the EI scale's validity and reliability and modified the scale according to our study's needs and requirements. The robustness of the EI model could be checked in future studies.

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