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EMOTIONAL INTELLIGENCE AND COGNITIVE STYLES AMONG UNIVERSITY STUDENTS

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ABSTRACT- The current study aimed to explore the relationship between emotional intelligence and cognitive styles of 3500 university students (men = 1832, women = 1662). It was found that emotional intelligence (EI) was significantly positively associated with cognitive style by using Object Spatial Imagery and Verbal Questionnaire (Blazhenkova & Kozhevnikov, 2009) and Self-Report Measure of Emotional Intelligence (Khan & Kamal, 2008). Interpersonal skills, emotional self-awareness, and verbal style were higher in women; while emotional self-regulation, object style, and spatial style are higher in men. Emotional self-awareness, spatial, and object styles were higher in postgraduate students; while interpersonal skills and verbal style were higher in undergraduate students. Emotional self-regulation and object styles were preferred more by older students; while interpersonal skills and spatial cognitive style are preferred more by younger students.

Keywords: relationship, emotional intelligence, cognitive styles, students

I. INTRODUCTION

Cognition is a collection of mental processes that includes perception, mindfulness, rationality, and decision power. According to Sternberg cognitive styles are individuals' specific characteristics and preference of particular modes to process information (as cited in Marrs, 2011). Literature provides evidence that every individual has his own habitual cognitive way process information for completing tasks or tackle situations and their related process of decision making, attention, perception, and problem-solving. These approaches of information process are conceptualized as cognitive styles, which were first formally introduced by Allport (as cited in Bendall, Galpin, Marrow, & Cassidy, 2016). Cognitive styles are the psychological dimension that represents a persistent pattern of cognitive functioning used by every individual especially related to the method of information processing (Ausburn & Ausburn, as cited in Kozhevnikov, 2007). Presently the most frequently used cognitive styles by scholars are the *Visual* style (based on imagery information), and *Verbal* style (based on verbal analytical strategies; e.g. Paivio; Richardson, as cited in Kozhevnikov, 2007). Similarly, some researchers hypothesize that cognitive style acts as a bridge between personality measures and cognition/intelligence measures (Ridding & Cheema, 1991; Sternberg & Grigorenko, 1997).

Cognitive style continuously attracts researchers because it has the power to predict an individual's behaviour in real-life, educational settings, and academic (Bernardo, Zhang, & Callueng, 2002; Sternberg & Zhang, 2001). Many researchers stated that cognitive styles are comparatively stable (e.g., Messick, as cited in Kozhevnikov, 2007), as it develops slowly and exponentially and does not represent simple habits. There is evidence that life experiences modify the cognitive style (Allinson & Hayes, 2012; Leonard & Straus, 1997), and following the external environmental demands, these styles adaptively changed (Zhang & Sternberg, 2005).

Existing literature on visual-verbal cognitive styles had the main emphasis on a general approach regarding the existence of two diverse information processing systems (Blazhenkova & Kozhevnikov, 2009). Two distinct approaches were used for the assessment of visual and verbal cognitive styles; the *First* approach deals with the objective measurement and the *second* approach based on self-report questionnaires' development (Blazhenkova & Kozhevnikov, 2009). After reviewing all the available literature on cognitive styles it was concluded that these styles heuristics in nature were used by individuals to process their environment-related information. These heuristics work from perceptual to metacognitive levels of information processing. Blazhenkova and Kozhevnikov (2009) re-examined the traditional Visual-Verbal cognitive style and demonstrating that object and spatial processing systems are different. So, they suggested a Tri-dimensional model for explaining cognitive style named "The New Object-Spatial-Verbal Cognitive Style Model". The present study based on this model, which comprised of relatively three independent dimensions: two visual dimensions; *Object Style* (deal with the physical appearance of objects e.g., shape, colour, texture etc.) *Spatial Style* (explain object's spatial association, its

position and movement); and one is *Verbal Style* (process comprehension, making spoken and written language). Cognitive styles have a strong association with the emotional intelligence of individuals (EI).

In psychology, EI is closely associated with human life which also includes the educational aspect that encourages the cognitive process because it usually associated with the academic performances of students and their learning mechanisms (Leasa, 2018). EI define as individual's to acknowledge not only his feelings and emotions but also the feelings/emotions of others, for the regulation of personal and other's bad/negative emotions in a good and positive way (Goleman, as cited in Alghamdi, Aslam, & Khan, 2017). The rate of a person's demonstration of his constituted competencies, or capabilities, inherited in EI deal with how individuals deal with their own lives, others' lives, and their work (Boyatzis, Goleman, & Rhee, 2000). It is the ability to: 1) be self-aware; 2) be other's aware, 3) regulate one's strong affective state; and 4) be adaptive to environment change (Bar-On, 1988). Individuals with higher EI have a higher tendency to tolerate stress and anxiety, as they are more flexible when they encounter stress and anxiety-provoking events (Afshar & Rahimi 2016), and also possessed a higher level of reasoning abilities (Saxena & Singhvi, 2015).

Emotional intelligence (EI) is considered to be a newly emerging field for investigating behaviour. The first psychological publication appears in an obscure journal in 1989 (Mayer & Salovey, 1997). Daniel Goleman's book "*Emotional Intelligence"* comes in 1995, which added to a popular interest that fast grew out of accumulated proportion to the knowledge by a few academic researchers in only a half a decade. The first relevant empirical studies on EI are also carried out by these researchers (Mayer, DiPaolo, & Salovey, 1990).

Emotional intelligence (EI) can be explained with the help of three models. The *ability model* of Mayer, Salovey, Caruso, and Sitarenios (2001), which assumes that to make sense and change the social environment this emotional information is very helpful (Salovey & Grewal, 2005). The *second model* introduced by Reuven Bar-On (2002) explains the impact of both cognitive and personality traits on an individual's overall level of well-being. Daniel Goleman (1995) introduces the *third mixed model* of EI which focused on mixed intelligence which is the combination of cognitive ability and personality aspects. Goleman (1995) stated that the largest single predictor of success in an individual's life is its emotional intelligence level.

Goleman Model of EI focuses on EI as a huge compilation of skills and competencies which leads to leadership performance (Goleman, 1998). Goleman stated that individuals have general EI by born that predicts their ability for learning emotional competencies (as cited in Boyatzis, et al., 2000). People didn't get these capabilities by birth rather these are learned capabilities to achieve outstanding performance. This EI model of Goleman gave four aspects of EI named; Self-awareness, Self-management, Social Awareness, and Relationship management. The present study focused on three aspects of Goleman's Model of EI: *Emotional Self-Regulation (*ability to effectively cope with the unpleasant event without showing harmful behaviour), *Emotional Self Awareness* (recognition of one's feelings and identification of its effects on their lives), and *Interpersonal Skills* (judgment of other's emotions, especially negative emotions; as cited in Goleman, 1995).

The very limited research literature is available for the relationship between EI and cognitive styles. Some previous studies found that EI and learning styles (synonymously used for cognitive styles in literature; Alavinia & Ebrahimpour, 2012; Goleman, 1998; Saklofske, Austin, & Miniski, 2003; Saklofske, Austin, Galloway, & Davidson, 2007) are associated significantly positively with each other. On the other hand, Johnson found a non-significant association between EI and learning styles (as cited in Alavinia & Ebrahimpour, 2012).

The rationale of the Study

This research aimed to explore the relationship of EI with cognitive styles in university students. Though studies are available on EI (e.g., Caruso, & Salovey, 2004; O'Connor, Hill, Kaya, & Martin, 2019) but with other variables; such as cognitive intelligence (Ramchandran, Tranel, Duster, & Denburg, 2020), job performance at work (O'Boyle, Humphrey, Pollack, Hawver, & Story, 2011), job satisfaction (Kappagoda, 2011), academic performance (Lawrence & Deepa, 2013; Stevens, Schneider, Bederman-Miller, & Arcangelo, 2019). Unlike EI there is very limited research work exist related to cognitive styles especially on both verbal and spatial cognitive styles (Blajenkova, Kozhevnikov, & Motes, 2006; Blazhenkova, Becker, & Kozhevnikov, 2011). Though both EI has a centre of attention in psychological research, still the existing literature failed to explain the connection of EI with academic achievement of specifically on post-secondary academic achievement (Stevens, et al., 2019). So this research paper tried to explore the missing links/gaps in the literature regarding the interaction of EI with their cognitive styles, which are necessary to know for a better understanding of the working of cognition in perceiving things and dealing with emotions.

II. METHOD

Objectives

1. To determine the association of EI with the cognitive styles of university students.
2. To find out the demographic differences (age, gender, and education) on EI and cognitive styles of university students.

Hypotheses

1. Emotional Self-Regulation will have a positive relationship with Object and Verbal Cognitive Styles.
2. Emotional Self Awareness will have a positive relationship with Verbal cognitive style.
3. Interpersonal Skills will have a positive relationship with Verbal and Spatial Cognitive Style.
4. Age and gender differences will exist in EI and cognitive styles.
5. Postgraduate students will show high scores on emotional intelligence and cognitive styles than undergraduate students.

Operational Definitions of Variables

Cognitive Styles: Cognitive styles are those preferred ways/methods which are used by people to process the received information and use them (Olagbaju, 2020). The present research studied three cognitive styles; Object, Spatial, and Verbal (for details see Introduction part). They are operationalized on the scores of subscales of OSIVQ.

Emotional Intelligence (EI): EI deals with understanding the ability to use and manage emotional state positively to elevate associated stress, for effective communication, to understand other's emotions empathetically, and to resolve conflicts in daily life (Segal, Smith, Robinson, & Shubin, 2020). The present study focus on three aspects of EI given by Goleman named; emotional self-regulation, emotional self-awareness, and interpersonal skills (for details see Introduction part). They are operationalized on the scores of the subscale of SRMEI.

Sample

The sample of the present study was *N* = 3500 (men *n*=1832, women *n*=1668; *younger aduts = 1770, older adults = 1730; undergraduate students = 1840, postgraduate = 1660*), along with age range from 18-40 years (*M* =31.23, *SD* = 4.54). A convenient sampling technique was used to select a sample from university students' population of Rawalpindi, Islamabad, Lahore, Sargodha, Multan, Faisalabad Peshawar, and Hazara. Those students who were included in the study were taking physical classes on campus in regular mode, and those who were enrolled in virtual, distant learning or online courses or degrees were excluded from the study.

Instruments

Self-Report Measure of Emotional Intelligence (SRMEI): Khan and Kamal (2008) develop these 60 items instruments to measure EI having scored on a five-point Likert scale. This scale measure three aspects of EI named; interpersonal skills, emotional self-regulation, emotional self-awareness). Its 27 items have positive and 33 items have reverse scoring.

Object–Spatial Imagery and Verbal Questionnaire (OSIVQ): This scale was developed by Blazhenkova and Kozhevnikov (2009), which comprised of 45 items with scoring on a five-point Likert scale. It gave information on three cognitive styles (object, spatial, and verbal). Its 41 items are positively worded and 4 items are negatively (reverse) worded.

Procedure

In this research, a sample of 3500 students was approached from the universities of Sargodha, Faisalabad, Islamabad, Multan, Rawalpindi, Peshawar, Lahore, and Hazara. Informed consent was taken from all respondents. It is requested to all respondents to give a response on each item of all questionnaires. All the necessary steps were taken to ensure the ethically protect the privacy and confidentiality of respondents. The response rate was 77% and the final collected data was analyzed through IBM SPSS 21for hypotheses testing.

III. RESULTS

The results of analyses revealed that all scales are reliable as the alpha value for SRMEI is .91 and alpha values for its subscale ranges from .79 to .86. Similarly, the alpha value for OSIVQ is .89, and for its subscale, the value ranges from .71 to .89. The significant positive results of item-total and inter-scale correlation coefficient on SRMEI and OSIVQ showed that they have above-average construct validity.

Table 1

Correlation Matrix between the Subscales of both SRMEI and OSIVQ (N=3500)

	Subscale of OSIVQ				
Subscale of SRMEI	Object	Verbal	Spatial	*M*	*SD*
Emotional self-Regulation Scale (ESRS)	.67**	.45**	.42**	85.43	17.25
Emotional Self Awareness Scale (ESAS)	.72**	.20**	.22**	65.78	11.24
Interpersonal Skills Scale (ISS)	.79**	.16**	.23**	36.19	8.48
M	54.15	55.85	52.95		
SD	7.65	9.79	6.45		

***p*<.01

The findings in Table 1 show that all subscales of an SRMEI (ESRS, ESAS, & ISS) are significantly positively associated/linked with all subscales of OSIVQ (Spatial style, Object style, and Verbal style).

Table 2

Mean, Standard Deviation, and t-values of Men and Women University Students on Subscales of SRMEI and OSIVQ (N=3500)

Subscale	Men (*n* = 1832)		Women (*n* = 1668)				*CI 95%*		*Cohen's d*
	M	*SD*	*M*	*SD*	*t (3498)*	*p*	*LL*	*UL*	
ESRS	86.94	14.20	83.49	19.50	5.99	.001	2.60	.587	0.20
ESAS	63.88	13.14	67.81	13.51	8.71	.001	-4.41	-2.63	0.24
ISS	34.89	7.38	36.95	9.12	3.41	.001	1.01	.313	0.12
Verbal	53.05	7.89	56.32	9.30	9.10	.001	2.56	3.97	0.31
Object	66.85	2.38	64.94	1.60	13.06	.001	.77	1.04	0.45
Spatial	58.39	7.01	53.26	10.72	16.91	.001	4.54	5.73	0.57

Note. UL= Upper Limit, CI = Confidence Interval, LL= lower Limit, ISS =Interpersonal Skills Scale, ESRS=Emotional Self-Regulation Scale, ESAS=Emotional Self-Awareness Scale, SRMEI= Self-Report Measure of Emotional Intelligence.

Table 2 shows gender has significant differences on ESAS, ISS, and ESRS (subscales of Self-Report Measure of Emotional Intelligence), and as women show higher scores on ISS and ESAS, while men show higher scores on ESRS. Similarly, significant gender differences emerged on all subscale of OSIVQ (object, verbal, and spatial). It shows that men rely more on Object and Spatial styles; on other hand, women prefer to rely more on verbal style.

Table 3

Mean Comparison of Younger and Older University Students on Subscales of SRMEI and OSIVQ (N=3500)

Subscale	Younger students (*n* = 1770)		Older students (*n* = 1730)				*CI 95%*		Cohen's *d*
	M	*SD*	*M*	*SD*	*t (3498)*	*p*	*LL*	*UL*	
ESRS	79.78	16.97	90.77	15.45	20.02	.001	-12.1	-9.91	0.96
ESAS	60.41	11.77	61.40	12.81	26.42	.062	-11.8	-11.2	0.09
ISS	40.42	8.95	32.50	7.77	27.96	.001	-8.46	-7.41	0.94
Verbal	54.74	10.13	54.78	11.32	0.12	.901	-.75	.67	.003
Spatial	57.69	8.51	54.21	6.10	2.03	.037	1.16	.08	0.12
Object	65.82	1.76	67.03	2.24	17.9	.001	-1.35	-1.08	0.60

Note. UL= Upper Limit, CI = Confidence Interval, LL= lower Limit, ESRS=Emotional Self-Regulation Scale, ISS =Interpersonal Skills Scale, SRMEI= Self-Report Measure of Emotional Intelligence, ESAS=Emotional Self-Awareness Scale.

Significant age differences exist on ESRS, ISS, spatial, and object style, while non-significant differences exist on ESAS and verbal cognitive style as shown in Table 3. Significant results indicated that older students have higher scores on ESRS and object cognitive style, while younger students show higher scores on the ISS and spatial style.

Table 4
Mean Comparison of Under and Post Graduate University Students on Subscales of SRMEI and OSIVQ (N=3500)

Subscale	Under Graduate (*n* = 1840)		Post Graduate (*n* = 1660)				*CI 95%*		Cohen's *d*
	M	*SD*	*M*	*SD*	*t (3498)*	*p*	*LL*	*UL*	
ESRS	85.24	16.82	85.19	17.50	.082	.935	-1.09	1.18	.002
ESAS	64.82	11.29	67.98	13.58	4.74	.001	3.05	1.26	0.16
ISS	37.24	5.01	34.68	4.78	9.01	.001	2.18	.985	0.17
Verbal	57.54	10.75	51.67	9.85	16.78	.001	5.18	6.55	0.60
Spatial	53.52	8.69	58.14	9.35	15.11	.001	4.03	5.22	0.51
Object	66.34	2.08	68.50	4.12	2.28	.022	-.30	-.02	0.07

Note. UL= Upper Limit, CI = Confidence Interval, LL= lower Limit ISS =Interpersonal Skills Scale, ESRS=Emotional Self-Regulation Scale, ESAS=Emotional Self-Awareness Scale, SRMEI= Self-Report Measure of Emotional Intelligence.

Table 4 shows significant education differences on ESAS and ISS while non-significant differences on ESRS. It shows that the ESA level is higher among postgraduate students, while the ISS level is higher among undergraduate students. Significant education differences also exist on all cognitive styles of OSIVQ, as undergraduate students have higher scores on Verbal style while postgraduate students show higher scores on Spatial and Object styles.

IV. Discussion

The current study aimed to explore the relationship EI has with the cognitive styles of university students, as well as to find the demographic differences (age, gender, education, and academic discipline) on them. The analysis indicated that both SRMEI and OSIVQ are reliable and valid scales. The findings of Table 1 showed that all subscales of SRMEI are significantly associated with all subscales of OSIVQ in a positive direction, which intern prove the first three hypotheses of this research. These results get support through a previous study (Sahin, Guler, & Basim, 2009) who found that both cognitive intelligence and emotional intelligence are positively associated with each other. Existing literature reveals that EI appears to be more strongly associated with verbal cognitive styles (Mayer, Salovey, & Caruso, 2004; Roberts, Schulze, & MacCann, 2008). Similarly, Allinson and Hayes, (2012) also stated that Cognitive Styles Inventory is positively related to spatial cognitive style. Kustubayeva and Bagayeva stated that EI leads to the development of effective decision making because EI affects the memory, attention, and cognitive intelligence (cognitive styles) of individuals (as cited in El Othman, El Othman, Hallit, Obeid, & Hallit, 2020). In Pakistan Khan, Riaz, Batool, and Riaz (2016) conducted a study on university students, they concluded that intuitive and rational decision-making styles are significantly positively affected by EI.

The statistical analysis of the data explored that gender create significant differences concerning all subscales of SRMEI and OSIVQ. This analysis provides support to prove the fourth hypothesis of this research (see Table 2). This analysis indicated that women show high scores on ESAS, ISS, and verbal cognitive style, while men show high scores on ESRS, Object and Spatial cognitive style. These results are consistent with some previous findings, which explored EI, interpersonal skills, and emotional self-awareness women show higher scores (Naghavi & Redzuan, 2011); while on emotional self-regulation men show higher scores (Hassan, 2013). Previous literature found that males have higher scores on an intrapersonal skill scale and general mood management scale; while female show a higher level of

interpersonal intelligence and emotional self-awareness (Bar-On, 2002; Meshkat & Nejati, 2017; Van Rooy, Alonso, & Viswesvaran, 2005).

Previous literature regarding the gender differences in cognitive styles reported that men prefer more to use spatial ability (Voyer, Voyer, & Bryden, 1995) and spatial imagery in cognitive processes (Blajenkova et al., 2006); while women prefer more to imagery vividness and object imagery in cognitive processing (Blajenkova et al., 2006; Richardson, 1995) and on verbal ability (Halpern, 2000). Some other previous studies also reported that women rely more on object visualizers, while men rely more on spatial visualizers (Arnup, Murrihy, Roodenburg, & McLean, 2013; Blazhenkova & Kozhevnikov, 2009; Kozhevnikov et al., 2005). Another study by Gates concluded that female students perform significantly better in verbal cognitive processing during their academic activities (speed reading, comprehension, and vocabulary) than males (as cited in Olagbaju, 2020).

Significant age differences were found on ESRS, ISS, object and spatial cognitive styles; while non-significant differences on ESAS and verbal style (see Table 3). This analysis partially proves the fourth hypothesis of the current research. This analysis indicated that levels of ESRS and object cognitive style are higher among older students, while the level of ISS and spatial cognitive style are higher among younger students. According to Bar-On (2002) emotional intelligence level is significantly affected by both gender and age of the respondents. Some other earlier studies also found a significant positive correlation between EI and their age (Van Rooy et al., 2005). A previous study (Riding & Al-Sanabani, 1998), found that with age the Object cognitive style increases, while Imager cognitive styles lose their strength among students. Similarly, Dror and Kosslyn (1994) reported that older students use a low spatial cognitive style which indicating that ageing may impair the individual's ability to maintain images.

The results of Table 4 showed significant education differences on ESAS, ISS, verbal, object, and spatial cognitive styles; while non-significant differences occur on ESRS. This analysis proved support to the fifth hypothesis of this research. These results showed that postgraduate students have higher levels of ESAS, spatial, and object cognitive styles; while undergraduate students have higher levels of ISS and verbal cognitive style. Some previous studies (Elizabeth, 2007; Parker, Summerfeldt, Hogan, & Majeski, 2004) provide support to these findings by revealing that EI correlates significantly to academic achievement. Some other previous studies (Rozell, Pettijohn, & Parker, 2002; Schutte et al., 1998) also stated that the students' scores of EI, which they got at the beginning of the academic year, are the significant predictors of their grade point average at the end of the year. Garg, Levin, & Tremblay, 2016) concluded in their study that emotional intelligence was indirectly linked with GPA of first-year.

Two basic reasons behind the positive relationship between EI and academic performance are; *first*, students have managed a large number of assignment work, develop adaptation power to the different styles of teaching, independently work for achieving goals, and to manage conflicts in the schedules of both academic and non-academic activities (Jex, 1998; Rode, et al., 2007). *Second*, the major work of academic is self-directed, which require high levels of self-management which is important aspects of emotional intelligence (Mayer & Salovey, 1997). One another previous study (O'Connor & Little, 2003) supported non-significant academic achievement differences on emotional self-regulation, which found that emotional self-regulation was not significantly related to the academic achievements of the students. Similarly, some other previous studies (Atay & Artan, 2005; Elizabeth, 2007) found that educational achievement increase students' ability to use more object or spatial cognitive way of thinking because the academic achievement creates mental maturity and in return, students start using more cognitive style for making their way of thinking and information processing.

V. Conclusion

It is concluded that cognitive styles and EI have a positive association with each other so the higher the number of people who use these styles will ultimately increase their EI. This study also found that women use ISS, ESAS, and verbal cognitive style more to process information; while men use ESRS, object, and spatial cognitive style for their cognitive processing. It was also concluded that the educational level of students positively linked with ESAS, spatial, and object cognitive while negatively link with ISS and verbal cognitive style. Another major conclusion is that with age individual prefer to use object cognitive style for ESRS, while yonder students use a spatial style more to develop their ISS.

VI. Limitations and Suggestions

The current research work only examines the association of EI with cognitive styles on just university students; do not explore that what is the causal association that existed between EI and cognitive styles;

and only studied the age, gender, and education differences of students. So, for the future, it is suggested to study the causal association of EI with cognitive styles on different age groups with some other demographic variables (e.g., ethnicity, social class etc.).

Implications of the Study

The current research results are helpful to understand the link between cognitive styles and the EI of individuals along with demographic characteristics (educational level, age, and gender). By using these results analyst can understand how individuals users (computer users, students, or information seekers) process their incoming information and how systems (computer interfaces, teaching styles, or information systems) can be built in an improved way for better accommodating the diversity of the user population. Also, these results have sound implications in an educational institution for curriculum setting and also for the management of organizational behaviour in different institutions. Previous studies explored that differences in cognitive style also influence the way of perception, metho for solving problems, learning, decision making, interpersonal functioning, communication, and creativity (Hayes & Allinson, 1994; Kirton, 2003; Sadler-Smith, 1998).

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