The left-hand column contains diagnoses or brief clinical vignettes. To complete the cells of the grid the student is required to match, stepwise, the various 'disciplinary investigations' to the diagnoses or clinical vignettes. When the puzzle is completed each horizontal row reflects a coherent medical case.

The second part of CR exam was arranged as "Key Feature" tests. A key-feature problem consists of a clinical case scenario followed by questions that focus on only those critical steps. The questions can be presented to require examinees either to write in their responses or to select them from a list of options. For each question, examinees are instructed to supply or select whatever number of responses is appropriate to the clinical task being tested, and answer keys can comprise one or several responses.

The last part of CR battery test consists of six challenging clinical reasoning problems (CRP). Each problem consists of a clinical scenario comprising presentation, history, and physical examination. Based on this information, subjects are asked to nominate the two most likely diagnoses and to list the clinical features that they consider in formulating their diagnoses, indicating whether these features supported or opposed the nominated diagnoses. For shortening the data, in this study, all parts of CR battery tests were added up and each student has a single mark in clinical reasoning.

California Critical Thinking Skills Test (CCTST)[19]*:* A 34 multiple choices measure that assess CT in two different manners. Items have been categorized based on the cognitive abilities in two sets. A set of item measures analysis and interpretation, inference and evaluation and explanation. Considering the arrangement, measure inductive and deductive reasoning. Answering the questions needs some presumptions, thinking, and inference. Each item has one credit and the maximum credit is 34[19-21] *Revised NEO Personality Five Factors Inventory (NEO-F FI)*[12]*:* A 60-item, self-reported questionnaire designed to measure five major personality dimensions. Respondents indicate level of agreement with each item on a five point Likert scale (one = strongly agree, five = strongly disagree). Higher score designates higher incidence of each personality trait. This widely used inventory assesses the ''Big Five" personality traits, namely neuroticism, extraversion, openness, agreeableness, and conscientiousness. Each trait includes six facets. Neuroticism indicates emotional stability and personal reaction to stress and anxiety. Extraversion/Introversion dimension point out if a person like social activities or s/he prefers to act by her/himself alone. Openness specifies how a person reacts with new experiments, new foods, and new places. Agreeableness trait measure if a person considers others and other people regard him too. Conscientiousness indicates if a person is dutifulness and responsible. The reliability and validity of the NEO-PI-R is well established (α = 0.86-0.93). Two-year test-retest reliabilities ranged from.83 to.91 for domains and from.64 to.86 for facets.[12] A recent article using the NEO FFI to study perfectionism had the internal consistencies at N = 0.85, E = 0.80, O = 0.68, A = 0.75, C = 0.83[13,22,23]

Bar-On Emotional Intelligence Questionnaire: A 90- item self-report measure. It requires individuals to rate the extent to which each statement represents them on a five point Likert scale. The individual's responses render a total EQ score, as well as scores on the following 5 composite scales and 15 subscales:[24-26]

- Intrapersonal
  - Self-regard
  - Emotional self-awareness
  - Assertiveness
  - Independence
  - Self-actualization
- Interpersonal
  - Empathy

Table 1: Descriptive statistics

Measure	Subscale	*N*	Range	Mean±SD	Reliability
Clinical reasoning[23]		69	32.33-59.85	50.31±5.25	
Critical thinking			7-21	14.25±3.14	62%
Neo personality five factor inventory	Neuroticism	64	13-40	27.65±6.6	67%
	Extraversion	62	32-54	39.87±5.53	
	Openness	62	26-48	39.38±5.13	
	Agreeableness	64	30-49	36.84±4.5	
	Conscientiousness	64	35-50	42.25±5	
Emotional intelligence	Problem solving	64	19-27	22.02±2.6	66%
	Happiness	64	14-22	17.52±1.69	
	Independence,	64	10-20	14.51±2.44	
	Stress tolerance	64	10-22	16.39±2.64	
	Self-actualization	64	13-24	15.87±2.16	
	Emotional self-awareness	64	13-23	17.93±2.21	
	Reality testing	64	11-25	16.03±2.86	
	Interpersonal relationship	64	17-30	23.64±3.83	
	Optimism	64	15-27	21.38±2.52	
	Self-regard	64	16-26	21.5±2.63	
	Impulse control	64	9-29	16.11±5.53	
	Flexibility	64	14-22	17.91-2.17	
	Social responsibility	64	22-27	25.05±1.38	
	Empathy	64	18-30	24.93±2.92	
	Assertiveness	64	14-25	18±2.44	

Social responsibility
Interpersonal relationship

- Stress Management
  Stress tolerance
  Impulse control

- Adaptability
  Reality testing
  Flexibility
  Problem solving

- General mood
  Optimism
  Happiness

RESULTS

Descriptive statistics

Descriptive statistics is presented in Table 1.

Correlation between EI, personality, CT and CR

Correlations (available data using pair wise correlations) between all measures are shown in Table 2. The reliability of this data was confirmed by comparing with list wise correlations, which revealed markedly similar outcomes.

The results indicate that clinical reasoning is the most significant correlate of some EI subscales (independence, stress tolerance, emotional self-awareness, reality testing, social responsibility, and assertiveness); but there is low correlation between CR, CT and personality subscales. On the other hand, correlation coefficient for clinical reasoning and problem solving (subscale of EI) is only.07. Low to moderate correlation observed between many personality and EI subscales observed.

Table 3: Hierarchical regression of CR on CT, personality and EI

Regression step	Predictor variable	β	B	R^2 Change
Step 1	Critical thinking	0.128	0.124	0.016: F=1.724, *P*=0.192
Step 2	Personality			0.065; F=1.382; *P*=0.238
	Neuroticism	−0.317	−0.145	
	Extraversion	0.386	0.2	
	Openness	0.384	0.211	
	Agreeableness	0.394	0.236	
	Conscientiousness	0.758	0.384	
Step 3	EI			0.46; F=6.538; *P*=0.000
	Problem solving	0.46	0.633	
	Happiness	−0.295	−0.547	
	Independence	−0.109	−0.129	
	Stress tolerance	0.361	0.383	
	Self-actualization	0.33	0.416	
	Emotional self-awareness	0.496	0.664	
	Reality testing	0.256	0.27	
	Interpersonal Relationship	−0.173	−0.139	
	Optimism	−0.167	0.2	
	Self-regard	0.142	0.165	
	Impulse control	0.161	0.086	
	Flexibility	−0.121	−0.145	
	Social Responsibility	0.245	0.464	
	Empathy	0.044	0.04	
	Assertiveness	−0.184	−0.214	

Hierarchical regression analysis

Hierarchical regression analysis estimated shared variance attributable to each EI and personality measure. For each regression model, CR was dependent variable, with personality, EI, and critical thinking measure as independent variables (Step1 = critical thinking; Step 2 = personality; Step 3 = EI measure). Results of all multiple regression s are summarized in Table 3, which shows the significant contribution to clinical reasoning by EI measures (R^2 change = 0.46)

DISCUSSION

Clinical reasoning is the main competency that a physician should attain. Medical schools and licensing bodies need to understand the nature of this construct and predict it and find influential factors to improve it. This study has investigated the clinical reasoning and other pertaining variables including critical thinking, emotional intelligence, and personality.

Considering previous literature CT is a meta-cognition competency and is pre-requisite for CR.[27] Many studies, especially those pertaining clinical reasoning in nursing,[28] considered CR and CT two interrelated variables, and suppose that CT predicts CR. The results in this study indicate that not only CT is not correlated to CR but also considering the regression model, CT does not contribute to CR variance. Articles tried to evaluate Critical thinking as a cognitive ability did not interpret it as a cognitive construct.[29]

It was presumed that some personality traits (especially neuroticism) may predict problem solving and consequently CR.[14] In our study, different result was achieved. CR is not only correlated to personality and its subscales, their contribution to CR variance was negligible,

The results show that emotional intelligence subscales provide most contribution to CR variance. Subscales (such as problem solving, stress tolerance and self-awareness) may predict CR variance considerably.

CONCLUSION

Clinical reasoning can be considered as a unique and specific construct that may not be predicted easily. The on ly measure that can be used for its prediction is EI. Although, the sample volume participated in this study may be not sufficient to provide significant results. It is suggested to conduct similar studies in learners with different level and larger samples.

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