Understanding The Relationship Between Emotional Intelligence, Eating Disorders, Blood Group and Cognitive Functioning Among Asian and African University Students

Kingsford Otabil[1], Dr. Priyaranjan Maral[2]

[1]Masters degree graduate, Department of Clinical Psychology, National Forensics Sciences University-Gandhinagar, India

[2]Assistant Professor, Department of Clinical Psychology, National Forensics Sciences University-Gandhinagar, India

Abstract

Introduction - The overall purpose of the study was to examine the relationship between emotional intelligence, eating disorders, blood group and cognitive functioning among Asian and African university students in India. That's how emotional intelligence and blood group type serves as aetiological factors for eating disorders and the degree to which these three Variables influence cognitive functioning among university students.

Objectives - The first aim of the study was to determine if any relationship exist between emotional intelligence, eating disorders, blood groups and cognitive functioning among Asian and African Students. Our second aim was to investigate the impact of eating disorders, emotional intelligence and blood groups on cognitive functioning, as well as to find the role of blood groups on aetiology of eating disorders. And finally, to also investigate the role of cultural differences on emotional intelligence, eating disorders and cognitive functioning

Methods and Material - The study considered sample size of 120 African and Asian university students at National forensic sciences university (NFSU) who were residing in India and continuing their studies from undergraduate to PhD in all academic streams during the time of the study with ratio of equal African and Asian as well as male to female. Tools used in the study were eating disorders diagnostic scale by Stice, E., Fisher, M., & Martinez, E. (2004), Schutte Self Report Emotional Intelligence Test (SSEIT) and Montreal cognitive assessment (MOCA).

Results – We found positive correlation between blood group and cognitive functioning with correlation value of .241** at 0.01 significant level. Blood group was also found to be negatively correlated to eating disorders with correlation value of -237** at 0.01 significant level and positively correlated with emotional intelligence with correlation value of .187* at 0.01 significant level. We also found that, cognitive functioning was negatively correlated to eating disorders with correlation value of -.842** and positively correlated to emotional intelligence with correlation value of .781. ** This reveals that, people who are having eating disorders are more likely to perform poorly in cognitive functioning. Our results also shows that, emotional intelligence was negatively correlated to eating disorders with correlation value of -.745.** This can be interpreted as people who have high emotional intelligence are of low risk of developing

eating disorders compare to those with low emotional intelligence. Finally, we also found significant difference between Asian and African students on the basis of emotional intelligence level, cognitive functioning and eating disorders.

Conclusion - In conclusion, the result of this study shows that, there is a correlation between emotional intelligence, eating disorders, blood groups and cognitive functions. Also, Asian and African students differ on emotional intelligence level, cognitive functioning and eating disorders. But emotional intelligence, eating disorders and cognitive functioning is not dependent on different academic level. That's no significant difference was found between different academic level, that's undergraduate, post-graduate and PhD on eating disorders, emotional intelligence and cognitive task

Keywords: Emotional intelligence, Blood group, Eating disorders, Cognitive functioning, Asian and African Student

INTRODUCTION
Emotional intelligence
Emotional intelligence (EI) is a person's ability to recognize their own emotions, understand those emotions, distinguish their own from those of others, and apply that information to a variety of life situations. Peter Salovey and John Mayer (1990) defined emotional intelligence as "the ability to monitor one's own and others' emotions, distinguish between and appropriately label emotions, and use emotional information to guide thought and action". According to that definition, emotional intelligence is thought to consist of four main components of skill: perception, use, understanding, and management of emotions. However, there is considerable disagreement about the definition of emotional intelligence, both from a terminological and operational perspective. Emotional intelligence now has his three main models: ability model, mixed model, and trait mode.

Models of Emotional Intelligence
Ability Model
Peter Salovey and John Mayer proposed the ability model, and based on their work, they defined emotional intelligence as "the ability to monitor one's own and other people's emotions, to discriminate between different emotions and label them appropriately, and to use emotional information to guide thinking and behaviour". Thus, from their definition, this model recognizes that EI includes four distinct types of ability which are perceiving, using, understanding, and managing emotions.

Figure 1. The four distinct types of emotional intelligence ability according to the ability model, proposed by Peter Salovey and John Mayer. Adapted from 'Slideshare,' by Ahmed Moussa, 2014, Slideshare.
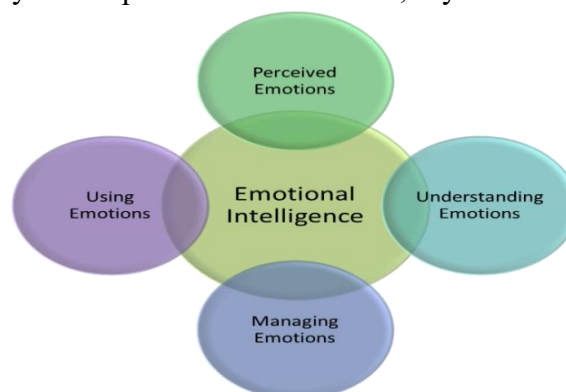
Emotional Perception: The first dimension of ability in emotional intelligence base on the ability model is the emotional perception. This is the ability of the individual to recognize others' emotions as well as his or her own emotions through facial expression, body language, pictures, voices, etc.

Use of Emotions: The second dimension of ability is the use of emotions. This is when the individual is able to use emotions which can be individual's own or others to help achieve a desirable outcome through various cognitive activities such as thinking and problem solving. That's individual can take advantage of his or her emotions or mood changes to suit a particular task at hand.

Understanding Emotions: This is the tendency to decipher language of emotions and appreciate the complexities of emotional relationships. That's the individual's ability not only to recognize his or others' emotions, but also being able to comprehend them.

Managing Emotions: The fourth dimension of ability is the managing of emotions. This is the ability to control our own and other's emotions including both negative and positive in different context or situations to achieve desirable outcomes or objectives.

Mixed Model

Another significant model which explains the concept of emotional intelligence is the mixed model. In the mixed model of emotional intelligence, there are two sub-models which are Goleman's Emotional Competencies and Bar-On's model of emotional-social intelligence.

Model of emotional competency (Goleman): The emotional competency model was proposed by Daniel Goleman. He defined emotional intelligence as the combination of different skills and competencies that improve leadership performance. In this model, Goleman identified his five main components of emotional intelligence: self-awareness, self-regulation, social skills, empathy, and motivation.

Figure 2. The five key emotional intelligence constructs according to Goleman model. Adapted from 'The neurosurgical atlas'. Copyright 2017 by Neurosurgical Atlas

Self-Awareness: This includes the ability to identify and understand one's own emotions, strengths, weaknesses, motivations, values, goals and how they affect others, while relying on intuition to make decisions. It is included.

Self-Regulation: Self-regulation involves controlling or redirecting disturbing emotions and impulses and adapting to changing circumstances.

Social Ability: This is the tendency to manage relationships in order to move people in the desired direction.

Empathy: Empathy deals with considering the feelings of others, especially when making decisions.

Motivations: This is the desire to succeed only for the sake of success.

The Bar-On Model of Emotional Social Intelligence (ESI): This model was developed by psychologist Reuven Bar-On. He defined emotional intelligence as "the development of the ability to effectively

understand and relate to others, including oneself, and to effectively manage, adapt, and deal with the dynamics of the environment". With On, emotional intelligence is developed over time and enhanced through exercise therapy and programming. He developed the so-called "emotional quotient". This indicates an emotional intelligence quotient that allows people with high EQ to thrive under environmental demands and stress. He also hypothesized that a lack of emotional intelligence is usually associated with emotional problems. Therefore, according to him, the potential for success in life lies in both cognitive and emotional intelligence.

Trait Model

The trait model was proposed by Konstantin Vasily Petrides. According to this model, unlike mixed model and ability model which consider emotional intelligence as ability and competencies, this model argues that Individuals have emotional traits or emotional self-awareness as part of their personality. According to the trait model, emotional intelligence is at the bottom of the personality hierarchy and is defined as a measurable set of emotional self-perceptions.

Figure 3: Shows the diagrammatic representation of trait model. This model was proposed by Konstantin Vasily Petrides in 2001. Adapted from 'Free Management Ebooks.'

From the three models of emotional intelligence mentioned above, the current study follows the ability model and hence, the dimensions of emotional intelligence measured in this study is the dimensions proposed by the ability model. Existing literatures reveals that, there is correlation between emotional intelligence and eating disorders, blood group and cognitive functioning. (Pardelller et al., 2016) did a study on emotional intelligence and cognitive abilities - association and sex difference, and their findings shows that high emotional intelligence predict good cognitive abilities in healthy adults. Study by (Schutte et al., 2016) on emotional intelligence and cognitive performance also revealed that, study of the emotional intelligence construct holds promise for better understanding and perhaps in the future enhancing cognitive task performance. (Foye et al., 2018) did a study on Exploring the role of emotional intelligence on disorder eating psychopathology and their results revealed that, participants who reported having had an eating disorder had significantly lower total EI scores and lower scores on four EI subscales: appraisal of others' emotions, appraisal of own emotions, regulation of emotions, and optimism. A meta-analysis by (Zhang et al., 2021) on the relationship between emotional intelligence and eating disorders or disordered eating behaviours revealed that there is the relationship between EI and disordered eating behaviours, suggesting that individuals with higher EI are less likely to have disordered eating behaviours. Finally, study by (Shaikh et al., 2022) on Emotional Intelligence may have Association with Blood Groups revealed that blood groups were identified significantly with different emotional intelligence level. The students having blood group O found to be more emotionally intelligent.

Eating Disorders

Eating disorders are mental health disorder which affect individual's thoughts and eating behaviours, and in return significantly affect the person's physical or mental health negatively. According to the Diagnostic and Statistical Manual for Mental Disorders-Fifth Edition (DSM-5), eating disorders are defines as "behavioural condition characterized by severe, persistent disturbance in eating behaviours and is associated with distressing emotions and thoughts, which can affect physical, psychological, and social function". (APA,2013). The Diagnostic and Statistical Manual for Mental Disorders-Fifth Edition (DSM-5) recognizes three primary diagnostic criteria for eating disorders namely: anorexia nervosa, bulimia nervosa and binge eating (APA,2013).

Anorexia nervosa: This is characterized by restriction of energy intake relative to requirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health, intense fear of gaining weight or of becoming fat, and disturbance in the way in which one's body weight or shape is experienced (APA,2013). Anorexia nervosa is further divided into two sub-categories namely restricted type, which is characterized by during the last 3 months, the individual has not engaged in recurrent episodes of binge eating or purging behaviour (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas) and binge-eating purging type which is also characterized by during the last 3 months, the individual has engaged in recurrent episodes of binge eating or purging behaviour (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas) (APA,2013).

Bulimia nervosa: This is characterized by recurrent episodes of binge eating which is expressed by either eating in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than what most individuals would eat in a similar period of time under similar circumstances or sense of lack of control over eating during the episode, recurrent inappropriate compensatory behaviours in order to prevent weight gain, the binge eating and inappropriate compensatory behaviours both occur, on average, at least once a week for 3 months, Self-evaluation is unduly influenced by body shape and weight and the he disturbance does not occur exclusively during episodes of anorexia nervosa (APA,2013).

Binge eating disorder: It is characterized by recurrent episodes of binge, manifested by eating significantly more food than most people would eat in a specific period of time (eg, within 2 hours) in similar situations, or when one feels out of control of eating during an episode. Binge is accompanied by three or more of the following symptoms: eating much faster than normal, eating until uncomfortably full, eating large amounts of food even when not feel physically hungry, eat alone because you are ashamed of how much you eat, feel self-loathing, depressed, or feel very guilty afterwards, binge eating on average once a week for 3 months, binge eating not associated with repeated use of inappropriate compensatory behaviors such as bulimia nervosa, bulimia nervosa or anorexia nervosa It does not occur only during the course of disease (APA, 2013).

Theoretical Background/ Models of Eating Disorders

The evolution of the pathology of eating disorders has been explained or conceptualized from several theoretical perspectives. One of the models of interest for this study is the Tripartite Influence model which is discussed below.

Tripartite Influence model: the tripartite influence model is one of the influential models which tries to explain the aetiology of eating disorders. The model was proposed by Van den Berg et al (2002) which state that three primary core sources of influence which parents, peers and media contribute to the

development of body image and eating disturbances (Van den Berg et al., 2002). According to this model, the above three core factors mentioned work through two key mediators which are thin-ideal internalization and appearance comparison which in return influence body dissatisfaction abnormal eating behaviours as represented in the diagram below.

Figure 4. The diagrammatic representation of the tripartite influence model of eating disorders. Adapted from 'An exploration of the tripartite influence model of body dissatisfaction and disordered eating among Australian and French college women,' by Rodgers et al.,2011, ScienceDirect, Volume 8, issue3, paage208-215. Copyright 2012 by Elsevier Ltd.
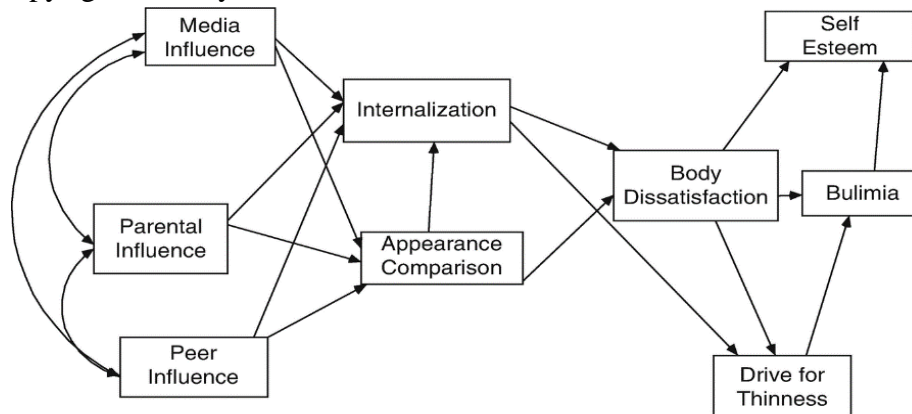
Eating Disorders Risk Factors

Eating disorders are complex disorders therefore, there is no single factor which can completely explain the likelihood of developing eating disorders. Risk factors for all eating disorders involve a range of biological, psychological, and sociocultural issues (National Eating Disorders Association [NEDA], 2022)

Biological Factors: Biological risk factors for eating disorders include many genetic factors such as predispositions to medical and mental illness. Several biological factors such as hormonal imbalances and different blood groups contribute to eating disorders development. A person's medical history may also increase the risk of eating disorders, as studies have shown certain illnesses such as type 1 diabetes is associated with an increased risk of developing eating disorders.

Psychological Factors: Psychological factors in eating disorders include co-diagnoses or comorbidities with another disorder. Additionally, research has shown that certain personality traits may increase the likelihood of developing an eating disorder, such as Perfectionism, low self-esteem, distorted body image, or impulsiveness. Experiencing past or current trauma also increases the likelihood of developing an eating disorder or disordered eating behaviour.

Sociocultural Factors: Sociocultural factors include the dynamics surrounding an individual. This may include familial relationships, as there is evidence that family-related beliefs and arguments about weight, diet, and self-image are associated with eating disorder diagnoses. Social views imbibed through peers, social media, television/movies, and consumer culture are also associated with increased incidence of eating disorders.

Available literature on eating disorders shows that, there is correlation between eating disorders and cognitive functioning. A study by (Isles, 2000) on cognitive functioning in anorexia nervosa and Bulimia patients shows that, both the eating disorders group thus, anorexia nervosa and Bulimia demonstrated a considerable number of neuropsychological deficits. Another study by (Telleus et al., 2014) on Cognitive Profile of Children and Adolescents with Anorexia Nervosa revealed that Inefficiency in nonverbal

intelligence functions and in specific cognitive functions was found in this study of children and adolescents with AN. Finally, a case study by (Hemmingsen et al., 2020) on cognitive performance in an extreme case of anorexia nervosa with a body mass index of 7.7 revealed good cognitive performance in a patient with severe and enduring AN with extremely low BMI varying between 7.7 and 9.3 during the study period of 1 year. However, some of her executive functions seem to be impaired.

Blood Group

Blood is a special body fluid made up of four main components: plasma, red blood cells, white blood cells, and platelets. Blood can be classified into different groups or types based on the presence or absence of antibodies and inheritable antigenic material on the surface of red blood cells.

Blood Group System

In 1900, Karl Landsteiner observed that some of the blood samples obtained in his experiments showed aggregation, or cluster formation. This experiment paved the way for his discovery of the "ABO blood group system". The ABO blood group system is based on the presence or absence of his two surface antigens on the surface of red blood cells: antigens "A", "A" and antigens "B", "B". Similarly, the plasma of various individuals contains her two natural antibodies, proteins produced in response to antigens. Based on the aggregation of antigens and antibodies, in humans he has 4 blood groups defined: A, B, AB, O.

Table 1. ABO Blood Group System. Adapted from Blood Group and Red Cell Antigens (page. 28), by Dean.L.,2005, National Center for Biotechnology Information. Copyright 2005 by Bookshelf.

Blood Group	Antigens on RBCs	Antibodies in Plasma
AA	AA	anti-BB
BB	BB	anti-AA
ABAB	AA and BB	Nil
OO	Nil	anti-AA and anti-BB

Existing literature on blood groups shows that, there is some link between different blood groups and cognitive functions. A study conducted by Dr. Mary Cushman of the University of Vermont School of Medicine in Burlington found that while blood type AB is found in only about 4% of the U.S. population, people with this blood type are more likely of 82% than others to develop thinking and memory problems and can lead to dementia. Also, a work done by Margo Pierce (2015) on the Strange Link Between Blood Type and Cognitive Health, the results showed that participants with the least common blood type AB, were 80 percent more likely to develop cognitive problems during the study period than people with other blood types. Finally, a study conducted by Matteo De Marco & Annalena Venneri (2015) at the University of Sheffield have found that blood type plays a role in nervous system development and may increase the risk of developing cognitive decline. The study found that people with blood type 'O' have more grey matter in their brains than people with blood type 'A', 'B' or 'AB', which helps protect against diseases such as Alzheimer's disease.

Cognitive Functioning

Cognitive Functioning are multiple mental abilities are brain-based skills needed for effective daily life endeavours which includes attention, memory, problem solving, decision making, etc. In other words,

cognitive functioning can be defined as a set of aptitudes, attitudes, processes and faculties of our mind that allow us to perceive, attend, process, select, interpret, analyse and respond to everything and everyone around us and to be able to adapt ourselves adequately to our environment and to the different contexts and situations that are presented to us at any given moment and which require a reaction, either by action or by inhibition of behaviour, on our part.

The Most Common Cognitive Functioning

Memory, attention, cognition, language, executive functioning, orientation, reasoning, motivation, mental flexibility, decision-making, planning, and problem-solving are the major cognitive skills, all of which are relevant to information processing. Most research on cognitive task focuses on the above-mentioned domains of cognitive capacities. For example, A case study by (Hemmingsen et al., 2020) on cognitive performance in an extreme case of anorexia nervosa and study by (Alexander, 2014) of University of Vermont who Investigated the link between blood type and cognitive health focused their cognitive task on executive functions, memory, perception, mental flexibility, etc.

Executive functions: Executive functions involves action plan, making decisions, generating an action plan, evaluating goals and subgoals, monitoring the different goal-oriented steps, reorienting and correcting actions that deviate us from the action we want to achieve, making final and intermediate objectives flexible, and promoting and initiating the beginning of actions, organize, anticipate, inhibit.

Orientation: Orientation, on the other hand, allows us to be properly integrated in space and time, to know where we are physically, what day it is today, what time of the year, and what part of the day and also, offer us the ability to access information that helps us survive and information from the environment

Language: Language is the ability that allows us to distinguish ourselves from other animals. We have generated code that translates our feelings and thoughts into words that people around us can understand. We can describe the course of action, reminisce, or express our needs, and helps us read directions, understand what others say, and many more. Language skills are divided into spoken language and written language.

Perception: Perception allows usfirst approach to stimuli, the first acknowledgement of them, to capture them, as the nomenclature of this capacity indicates, to perceive them, to realize that something is calling us.

Attention: Attention is the ability to focus desire on relevant information and help to ignore irrelevant information when presented.

Memory: Memory is the capacity which allow us to encode information, store it and retrieve it for future use

REVIEW OF LITERATURE

Existing literature on cognitive functioning and eating disorders reveals that, there is correlation between cognitive functioning and eating disorders as described by the following literatures. A study by (Isles, 2000) on cognitive functioning in anorexia nervosa and Bulimia shows that both the eating disorders group that's anorexia nervosa and Bulimia demonstrated a considerable number of neuropsychological deficits. A study by (Telleus et al., 2014) on Cognitive Profile of Children and Adolescents with Anorexia Nervosa revealed that Inefficiency in nonverbal intelligence functions and in specific cognitive functions was found in this study of children and adolescents with AN. (Grau et al., 20219) conducted study on Cognitive impairment in eating disorder patients of short and long-term duration and their results revealed that

cognitive impairment was more frequent in patients with long-term eating disorders, above all with regard to perceptual measures and non-verbal memory. A study by María José Bracho (2019) on Cognitive function in women with eating disorders, a systematic literature review offered evidence that women with ED have a different cognitive performance. Results varied across the studies; nevertheless, in broad terms, a strong correlation between ED and difficulties in executive functions and social cognition was found, especially in set-shifting, central coherence, decision-making, and working memory. A case study by (Hemmingsen et al., 2020) on cognitive performance in an extreme case of anorexia nervosa with a body mass index of 7.7 revealed good cognitive performance in a patient with severe and enduring AN with extremely low BMI varying between 7.7 and 9.3 during the study period of 1 year. However, some of her executive functions seem to be impaired. (Rylander et al., 2020) did a study on evaluation of cognitive functions in patient with severe anorexia nervosa before and after medical stabilization and their results indicated that there are no baseline deficits in cognition in the sample of women with severe anorexia nervosa. (Cholet et al., 2021) did Evaluation of cognitive impairment in a French sample of patients with restrictive anorexia nervosa and their results shows that Patients suffering from AN-R had significant impairment in information processing speed and planning. Two distinct subgroups of patients were identified. The first subgroup had more marked cognitive impairment and fewer psychopathological symptoms than did the second subgroup of patients and the HC group. A systematic review and three-level meta-analysis by (Iceta et al., 2021) on Cognitive function in binge eating disorder and food addiction shows that a significant overall effect was found for global cognitive impairments, suggesting that individuals with BED or FA have poorer performances when completing cognitive tasks. Analyses for specific cognitive domains revealed that individuals with BED showed poorer performances at tasks assessing cognitive flexibility, inhibitory control, attention and planning. Study by (seidel et al., 2021) on Cognitive Function in Adults with Enduring Anorexia Nervosa revealed that patients suffering from anorexia nervosa showed increased performance in cognitive tasks despite their illness. That's there is no correlation between anorexia nervosa and cognitive functioning.

Trying to understand the relationship between blood groups and cognitive functioning, existing literatures reveals that there is a relationship between blood groups and cognitive functioning. According to the study by (Alexander, 2014) of University of Vermont who Investigated the link between blood type and cognitive health, the results shows that participants with the least common blood type AB, were 80 percent more likely to develop cognitive problems during the study period than people with other blood types. A study by Atoom MS (2014). Blood Groups and their Relationship with Intelligence among a Sample of Jordanian Universities students found that the blood group (AB) received the highest average in the Intelligence Quotient (IQ) test which is also the highest in the GPA. And that the blood type (B) was the lowest in the GPA and in test results. A study conducted by Matteo De Marco & Annalena Venneri (2015) at the University of Sheffield revealed that blood types play a role in the development of the nervous system and may cause a higher risk of developing cognitive decline. The study revealed that people with an 'O' blood type have more grey matter in their brain, which helps to protect against diseases such as Alzheimer's, than those with 'A', 'B' or 'AB' blood types. A work done by Margo Pierce (2015) on the Strange Link Between Blood Type and Cognitive Health, the results showed that participants with the least common blood type AB, were 80 percent more likely to develop cognitive problems during the study period than people with other blood types. According to study, led by Dr. Mary Cushman of the University of Vermont College of Medicine in Burlington, the blood type AB is only found in about 4% of the US

population, yet people with this blood type were 82% more likely than other types to develop the thinking and memory problems that can lead to dementia.

Existing literature on blood groups and emotional intelligence shows that there is a strong correlation between blood groups and emotional intelligence. A study conducted by Tamanna Gupta (2017) on Blood Groups and Emotional Intelligence reveals that there is significant difference among blood groups and emotional intelligence. Students who have B+ blood group scored higher on value orientation and who have AB+ blood group scored higher on empathy and emotional stability. A study conducted by Saifullah Shaikh (2020) on Emotional Intelligence may have Association with Blood Groups revealed that blood groups were identified significantly with different emotional intelligence level. The students having blood group O was found to be more emotionally intelligent. Study by (Shaikh et al., 2022) on Emotional Intelligence may have Association with Blood Groups revealed that blood groups were identified significantly with different emotional intelligence levels. The students having blood group O was found to be more emotionally intelligent.

Emotional intelligence has been found to be correlated to cognitive functioning as described by the following existing literatures. (Pardelller et al., 2016) did a study emotional intelligence and cognitive abilities - association and sex difference, and their findings shows that high emotional intelligence predict good cognitive abilities in healthy adults. According to the study by (Schutte et al., 2016) on emotional intelligence and cognitive performance, the results suggest that study of the emotional intelligence construct holds promise for better understanding and perhaps in the future enhancing cognitive task performance. A study conducted by (Foye et al., 2018) on Exploring the role of emotional intelligence on disorder eating psychopathology revealed that participants who reported having had an eating disorder had significantly lower total EI scores and lower scores on four EI subscales: appraisal of others' emotions, appraisal of own emotions, regulation of emotions, and optimism. The study by (Jung et al., 2019) on Relationships among stress, emotional intelligence, cognitive intelligence, and cytokines shows that, emotional intelligence was positively correlated with full-scale IQ scores and scores on the vocabulary, picture arrangement, and block design subtests of the IQ test. Work done by Venkatesh, S., & Fischer, C. (2019). Cognitive factors associated with emotional intelligence show that there is a positive correlation between emotional intelligence and cognitive functioning.

Existing literature on emotional intelligence and eating disorders reveals that, emotional intelligence is correlated to eating disorders. A study conducted by (Foye et al., 2018) on Exploring the role of emotional intelligence on disorder eating psychopathology revealed that participants who reported having had an eating disorder had significantly lower total EI scores and lower scores on four EI subscales: appraisal of others' emotions, appraisal of own emotions, regulation of emotions, and optimism. A systematic review on Emotional intelligence and eating disorders by (Romero et al., 2020) indicated negative associations between EI and the dimensions of ED. A meta-analysis by (Zhang et al., 2021) on the relationship between emotional intelligence and eating disorders or disordered eating behaviors revealed that there is the relationship between EI and disordered eating behaviors, suggesting that individuals with higher EI are less likely to have disordered eating behaviors.

Need for the Study

The overall purpose of this study is to understand the relationship between emotional intelligence, eating disorders, blood group and cognitive functioning. That's how emotional intelligence and blood group type serves as aetiological factors for eating disorders and the degree to which these three Variables influence

cognitive functioning among university students. From various existing literatures, it's showing that there is negative correlation between emotional intelligence and eating disorders, uncertain correlation between eating disorders and cognitive functioning and correlation between blood group type and cognitive functioning but no available literature on blood group and eating disorders.

Therefore, the present study aims to focus much on examining the relationship between blood group and eating disorders. It also aims to shed more light on the relationship between eating disorders and cognitive functioning since there are already existing contracting literatures. Also, the present study aims to find cultural differences in emotional intelligence, eating disorders and cognitive functioning.

That's how individuals from different cultures or tribes (Africans and Asians) differ in emotional intelligence, eating disorders and cognitive functioning.

Objectives

- To investigate the relationship between emotional intelligence, eating disorders, blood groups and cognitive functioning among Asian and African Students
- To investigate the impact of eating disorders, emotional intelligence and blood groups on cognitive functioning
- To find the role of blood groups on aetiology of eating disorders
- To investigate the role of cultural differences on emotional intelligence, eating disorders and cognitive functioning

Hypotheses

- There would be significant correlation between emotional intelligence, eating disorders, blood groups and cognitive functioning.
- Different blood groups and level of emotional intelligence and eating disorders will influence cognitive functioning among Asian and African Students
- There would be significant correlation between blood groups and eating disorders.
- Asian and African students will differ based on eating disorders, emotional intelligence and cognitive functioning.

METHODOLOGY

Samples

We conducted the study among African and Asian university students at National forensic sciences university (NFSU) who are currently residing in India and continuing their studies from undergraduate to PhD in all academic streams.

Sample Size

We included a total of 120 African and Asian university students with ratio of equal African and Asian as well as male to female.

Inclusion Criteria

- All African and Asian university students currently in India and studying at NFSU.
- Students with academic qualification ranging from undergraduate to PhD and studies still ongoing.
- Both male and female
- Age ranges from 18-35 years

Exclusion criteria

- Individuals who do not come under the category of university students from NFSU were excluded from the study.
- University students other than Africans and Asians were also excluded from the study.
- Students studying at postdoctoral level and below undergraduate level were excluded from the study.
- Students with psychiatric history and undergoing medications were also excluded from the study.

Tools Used

a) Eating disorders diagnostic scale by Stice, E., Fisher, M., & Martinez, E. (2004).

The eating disorders diagnostic scale by Stice. E., Fisher M., & Martinez, E. is a widely used scale for evaluating eating disorders. The scale consists of 22 (twenty-two) items which measures the three component of eating disorders namely Anorexia Nervosa, Bulimia Nervosa, and Binge Eating Disorder. Some of the items are answered using a 4-point Likert scale format ranging from not at all to extremely. Some of the items are also answered using yes or no and finally some of the items are also answered based on frequency of a behaviour or action occurring ranging from 1-10. All the answers are made based on the past 3 months.

b) Schutte Self Report Emotional Intelligence Test (SSEIT)

The Schutte Self Report Emotional Intelligence Test (SSEIT) is a 33 item self-report measure of emotional intelligence developed by Schutte et al. (1998). The SREIS has been designed to map onto the Salovey and Mayer (1990) model of EI. Items of the test relate to the three aspects of EI: (1) appraisal and expression of emotion (2) regulation of emotion (3) utilisation of emotion.

c) Montreal Cognitive Assessment (MoCA)

The Montreal Cognitive Assessment (MoCA) was developed in Canada in the year 1996, as a means of accurately detecting levels of cognitive impairment. The assessments in the test attempt to gauge areas of language, visuospatial abilities, memory and recall and abstract thinking, to give a representation of a person's current cognitive ability. The MoCA is administered over approximately ten minutes, with 30 possible points.

d) Blood groups

The various blood groups of the samples or the participants were collected through online questionnaire where the participants indicated or mentioned their blood group as confirmed by laboratory test.

e) Socio Demographic data

Socio demographic information of the participants were obtained through items focusing on the participant's Nationality, Gender, Current place of residing, and Education or Academic qualification.

Procedure

We executed the study in three different phases: in the phase one, we collected demographic details through online questionnaire from the samples. The participants were approached randomly based on their availability, and the nature and the need for the study were explained to them and were asked if they will be willing to participate in the study. After their consent was given, the questionnaire containing their demographic details was sent to them to fill it.

The second phase focused on using online questionnaire to collect data on eating disorders, blood group and emotional intelligence from the samples. Participants who completed the online questionnaire for the demographic data were moved on to the second phase of the study. Online questionnaire containing

information on eating disorders, blood group and emotional intelligence were shared with the participant to fill.

The third phase, which is the final phase was 10-15 minutes laboratory task which was used to measure or assesses the samples cognitive functioning with the help of Montreal Cognitive Assessment (MoCA). At the end of the second stage, total of 120 participant completed the phase 1 and 2 successfully and hence, they were invited to participate in the final phase where they were asked to complete cognitive task which lasted for 10-15 minutes.

Statistical Analysis

In order to test for the hypothesis, we used the following statistical analysis tools

Pearson correlation coefficient (r) and regression analysis were used to find the relationships or correlation between the various variables.

T-test was used to find gender differences as well as cultural differences on eating disorders, emotional intelligence and cognitive functioning among the students.

RESULTS

Table: 2

Table 2 shows the frequency, mean and the standard deviation.

	N	Mean	Standard Deviation
Continent	120	1.67	1.937
Academics	120	1.54	.564
Blood groups	120	4.10	3.206
Cognitive Task	120	26.57	1.516
Eating Disorders	120	5.08	3.547
Emotional Intelligence	120	135.54	11.349
Gender	120	1.50	.502
Valid N (Listwise)	120		

Table:3

Table 3 shows the correlation between eating disorders, blood group, emotional intelligence and cognitive functioning.

Correlation

	Blood groups	Cognitive Task	Eating disorders	Emotional Intelligence
Blood groups	1	.241**	-.237**	.187*
Cognitive Task	.241**	1	-.842**	.781**
Eating disorders	-.237**	-.842**	1	-.745**
Emotional Intelligence	.187*	.781**	-.745**	1

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

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

Table: 4

Table 4 shows the regression analysis between the dependent variable cognitive task and independent variables emotional intelligence, blood group and eating disorders.

Regression Statistics	
Multiple R	.847
R Square	.763
Adjusted R Square	.757
Standard Error	.747
Observations	120

ANOVA

	SS	Df	SM	F	Significance F
Regression	208.785	3	69.959	124.812	.000
Residual	64.682	116	.558		
Total	273.467	119			

	Coefficients	Standard Error	t Stat	p-value
Eating disorders	-.575	.029	-8.405	.000
Emotional Intelligence	.345	.009	5.098	.000
Blood groups	.040	.022	.856	.394

Table: 5

Table 5 shows the chi-square test value for continent and cognitive task.

	Value	df	Asymptotic significance (2-tailed)
Pearson Chi-square	26.007a	16	.054
Likelihood Ratio	14.201	16	.584
Linear-by-Linear Association	2.371	1	.124
N of valid Cases	120		

a. 19 cells (70.4%) have expected count less than 5. The minimum expected count is 0.1.

Figure 5

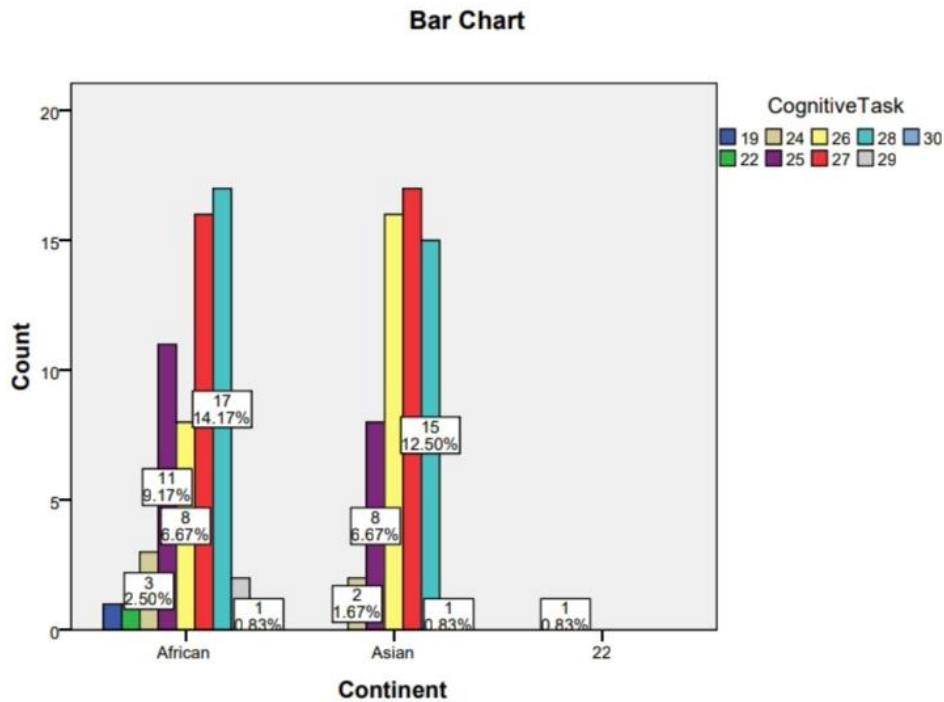*Figure 5 shows continent differences on cognitive task performance.*

Bar Chart

Table: 6

Table 6 shows the chi-square test value for continent and emotional intelligence.

	Value	df	Asymptotic significance (2-tailed)
Pearson Chi-square	1.500E2a	68	.000
Likelihood Ratio	51.084	68	.937
Linear-by-Linear Association	14.183	1	.000
N of valid Cases	120		

a. 99 cells (94.3%) have expected count less than 5. The minimum expected count is 0.1.

Figure 6

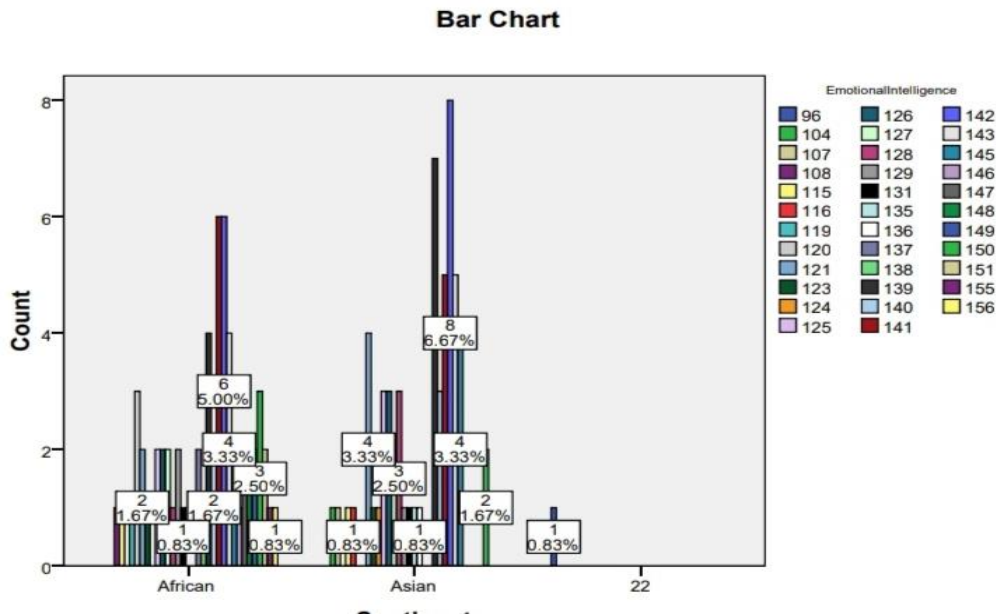*Figure 6 shows continent differences and their correspondent emotional intelligence percentage.*

Table :7

Table 7 shows the chi-square test value for continent and eating disorders.

	Value	df	Asymptotic significance (2-tailed)
Pearson Chi-square	148.508a	28	.009
Likelihood Ratio	18.171	28	.922
Linear-by-Linear Association	2.206	1	.138
N of valid Cases	120		

a. 35 cells (77.8%) have expected count less than 5. The minimum expected count is 0.1.

Figure 7

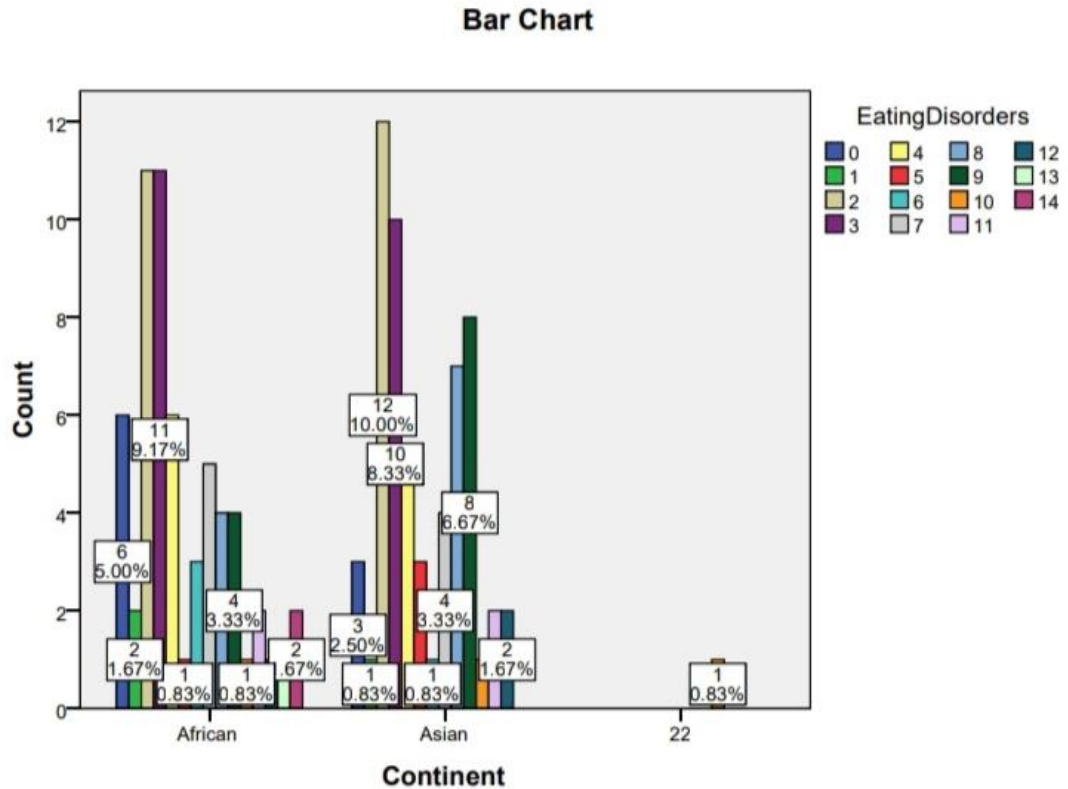*Figure 7 shows continent differences on eating disorders.*

Table: 8

Table 8 shows the Chi-square test value for academic level and cognitive task.

	Value	df	Asymptotic significance (2-tailed)
Pearson Chi-square	14.618a	16	.553
Likelihood Ratio	17.322	16	.365
Linear-by-Linear Association	.269	1	.604
N of valid Cases	120		

a. 19 cells (70.4) have expected count less than 5. The minimum expected count is 0.3.

Figure 8

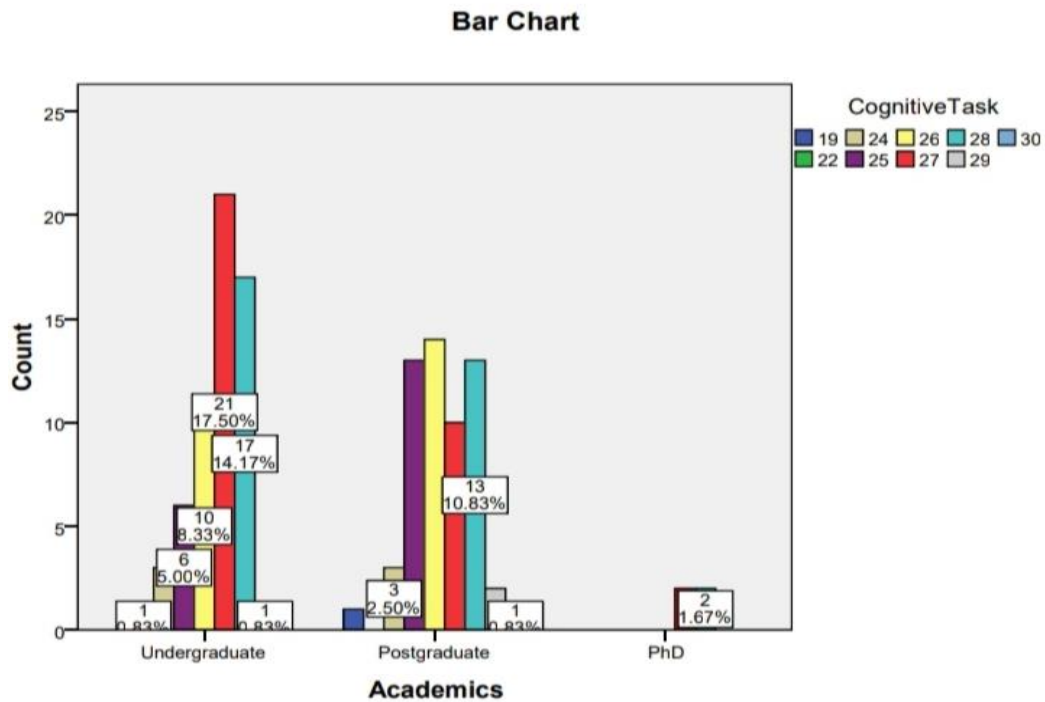Figure 8 shows different academic qualification and their correspondent cognitive task performance.

Table: 9

Table 9 shows the Chi-square test value for academic and emotional intelligence.

	Value	df	Asymptotic significance (2-tailed)
Pearson Chi-square	72.367a	68	.336
Likelihood Ratio	56.338	68	.843
Linear-by-Linear Association	.821	1	.365
N of valid Cases	120		

a. 99 cells (94.3%) have expected count less than 5. The minimum expected count is 0.3.

Figure 9

Figure 9 shows different academic qualification and their correspondent emotional intelligence percentage.
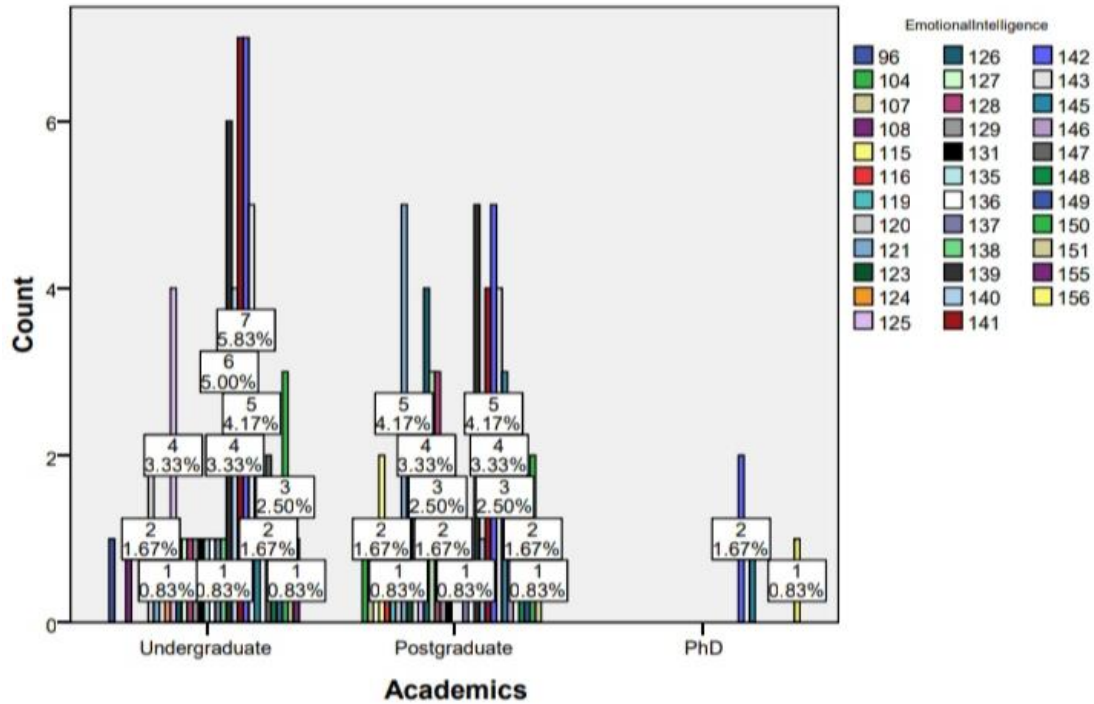

Table: 10

*Table 10 shows the chi-square test value for academic and eating disorders.*

	Value	df	Asymptotic significance (2-tailed)
Pearson Chi-square	22.401a	28	.762
Likelihood Ratio	24.248	28	.668
Linear-by-Linear Association	.511	1	.475
N of valid Cases	120		

a. 35 cells (77.8%) have expected count less than 5. The minimum expected count is 0.1.

Figure 10

Figure 10 shows academic qualification differences on eating disorders.
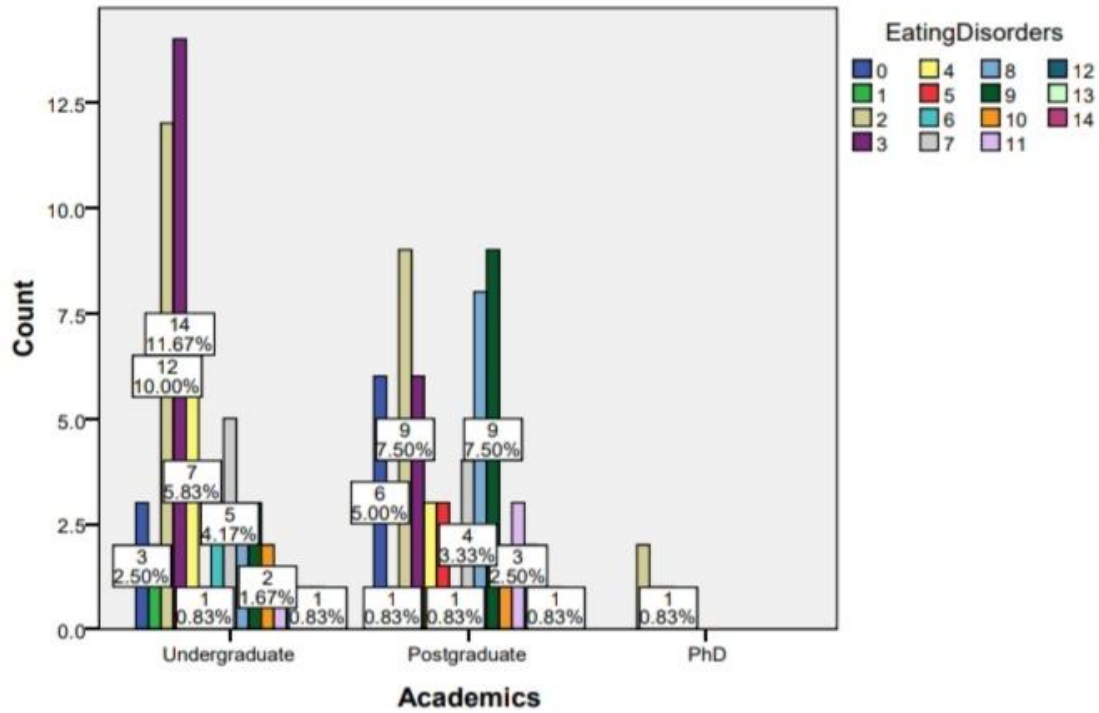
DISCUSSION

The overall purpose of the study was to understand the relationship between emotional intelligence, eating disorders, blood group and cognitive functioning. That's how emotional intelligence and blood group type serves as aetiological factors for eating disorders and the degree to which these three Variables influence cognitive functioning among Asian and African university students. We hypothesized that; 1. There will be significant correlation between emotional intelligence, eating disorders, blood groups and cognitive functioning; 2. Different blood groups, level of emotional intelligence and eating disorders will influence cognitive functioning among Asian and African Students; 3. There will be significant correlation between blood groups and eating disorders; 4. Asian and African students will differ based on eating disorders, emotional intelligence and cognitive functioning. Table 2 shows the correlation values for eating disorders, blood group, emotional intelligence and cognitive functioning. As we hypothesized, we found positive correlation between blood group and cognitive functioning with correlation value of .241** at 0.01 significant level. Blood group was also found to be negatively correlated to eating disorders with correlation value of -237** at 0.01 significant level and positively correlated with emotional intelligence with correlation value of .187* at 0.01 significant level. Our findings are consistent with some already existing literatures on blood groups, emotional intelligence, and eating disorders such as the study by (Alexander, 2014) of University of Vermont who Investigated the link between blood type and cognitive health, the results shows that participants with the least common blood type AB, were 80 percent more likely to develop cognitive problems during the study period than people with other blood types. Also, a study conducted by Matteo De Marco & Annalena Venneri (2015) at the University of Sheffield revealed that blood types play a role in the development of the nervous system and may cause a higher risk of

developing cognitive decline. Tamanna Gupta (2017) conducted study on Blood Groups and Emotional Intelligence and his results reveals that there is significant difference among blood groups and emotional intelligence. This can be interpreted as, blood group has influence on cognitive functioning, emotional intelligence and eating disorders among university students. We also found that, cognitive functioning was negatively correlated to eating disorders with correlation value of -.842** and positively correlated to emotional intelligence with correlation value of .781. ** This reveals that, people who are having eating disorders are more likely to perform poorly in cognitive functioning. This result is consistent with the available literatures which shows that eating disorders are always associated with poor cognitive task performance such as the study by study by (Isles, 2000) on cognitive functioning in anorexia nervosa and Bulimia which the results shows that both the eating disorders group, that's anorexia nervosa and Bulimia demonstrated a considerable number of neuropsychological deficits. In addition, people who score high on emotional intelligence are more likely to perform well cognitively than those with low emotional intelligence. Our results also shows that, emotional intelligence was negatively correlated to eating disorders with correlation value of -.745.** This can be interpreted as people who have high emotional intelligence are of low risk of developing eating disorders compare to those with low emotional intelligence.

Table 2 shows the regression analysis between dependent variable cognitive functioning and the three independent variables namely, eating disorders, blood group and emotional intelligence. As we hypothesized that different blood groups, level of emotional intelligence and eating disorders will influence cognitive functioning among Asian and African Students, we found the adjusted R square value to be .757.This means that 75% of the variability of cognitive functioning can be explained by eating disorders, emotional intelligence and eating disorders which is consistent with our hypothesis. We also found that even though 75% of the variability of cognitive functioning can be explained collectively by the three independent variables, but subjectively, only eating disorder and emotional intelligence was found to be significant contributors for the variability in cognitive functioning. (Refer to coefficient values of table 3).

Table 4 shows the Chi-square test analysis of continent and cognitive task. The p value was found to be .054. Which indicate that there is significant difference between Asian and African based on cognitive task. Also, significant difference was found between Asians and Africans on emotional intelligence with p value of .000. As shown by table 6, significant difference was also found between Asians and Africans based on eating disorders with p value of .009. The results show that eating disorder, emotional intelligence and cognitive task is dependent on continent. The study also found that there was no significant difference between different academic level, that's undergraduate, post-graduate and PhD and based on eating disorders, emotional intelligence and cognitive task.

Conclusion

In conclusion, the result of this study shows that, there is a correlation between emotional intelligence, eating disorders, blood groups and cognitive functions. Also, Asian and African students differ on emotional intelligence level, cognitive functioning and eating disorders. But emotional intelligence, eating disorders and cognitive functioning is not dependent on different academic level. That's no significant difference was found between different academic level, that's undergraduate, post-graduate and PhD on eating disorders, emotional intelligence and cognitive task

REFERENCES

1. Alexander, K. S., Zakai, N. A., Gillett, S., McClure, L. A., Wadley, V., Unverzagt, F., & Cushman, M. (2014, September 30). *Abo blood type, factor VIII, and incident cognitive impairment in the regards cohort. Neurology*. Retrieved May 1, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4180487/

2. American Psychological Association. (n.d.). Apa PsycNet. *American Psychological Association*. Retrieved May 1, 2023, from https://psycnet.apa.org/record/2021-77512-001

3. American Psychological Association. (n.d.). Apa PsycNet. *American Psychological Association*. Retrieved May 1, 2023, from https://psycnet.apa.org/record/2002-04037-004

4. Bracho, M. J. (2019, October 15). *Cognitive function in women with eating disorders, a systematic literature review.* Psychology. Retrieved May 1, 2023, from https://mjobracho.wixsite.com/psychology/post/cognitive-function-in-women-with-eating-disorders-a-systematic-literature-review

5. *Blood groups and their relation with intelligence among a sample of ...* (n.d.). Retrieved May 1, 2023, from https://www.academicresearchjournals.org/IJARER/PDF%202014/September/Atoom.pdf

6. Cholet, J., Rousselet, M., Donnio, Y., Burlot, M., Pere, M., Lambert, S., Rocher, B., Chirio-Espitalier, M., Eyzop, E., & Grall-Bronnec, M. (2020, August 7). *Evaluation of cognitive impairment in a French sample of patients with restrictive anorexia nervosa:* Two distinct profiles emerged with differences in impaired functions and psychopathological symptoms - eating and weight disorders - studies on anorexia, bulimia and obesity. SpringerLink. Retrieved May 1, 2023, from https://link.springer.com/article/10.1007/s40519-020-00981-w

7. *Cognitive profile of children and adolescents with anorexia nervosa.* (n.d.). Retrieved May 1, 2023, from https://www.researchgate.net/publication/269419161_Cognitive_Profile_of_Children_and_Adolescents_with_Anorexia_Nervosa

8. City Research Online - Core. (n.d.). Retrieved May 1, 2023, from https://core.ac.uk/download/163076743.pdf

9. Eating Disorders Review. (2019, November 23). The *effects of long-term eating disorders and cognitive impairment.* Eating Disorders Review. Retrieved May 1, 2023, from https://eatingdisordersreview.com/the-effects-of-long-term-eating-disorders-and-cognitive-impairment/

10. *Emotional intelligence and cognitive abilities – associations and sex …* (n.d.). Retrieved May 1, 2023, from https://www.researchgate.net/publication/310477116_Emotional_Intelligence_and_cognitive_abilities_-_associations_and_sex_differences

11. *Emotional intelligence may have association with Blood Groups.* PJMD. (n.d.). Retrieved May 1, 2023, from https://pjmd.zu.edu.pk/volume-9-issue-2/emotional-intelligence-may-have-association-with-blood-groups/

12. *Emotional intelligence and cognitive abilities.* (n.d.). Retrieved May 1, 2023, from https://directory.doabooks.org/handle/20.500.12854/46285

13. *Emotional intelligence may have association with Blood Groups.* (n.d.). Retrieved May 1, 2023, from https://www.researchgate.net/publication/340560296_Emotional_Intelligence_may_have_Association_with_Blood_Groups

14. *Emotional intelligence and disordered eating ...* - elizabethtown college. (n.d.). Retrieved May 1, 2023, from https://jayscholar.etown.edu/cgi/viewcontent.cgi?article=1005&context=landmark

15. Grau, A., Magallón-Neri, E., Faus, G., & Feixas, G. (2019, May 21). *Cognitive impairment in eating disorder patients of short and long-term duration:* A case-control study. Neuropsychiatric disease and treatment. Retrieved May 1, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6535667/

16. Giusti, E. M., Manna, C., Scolari, A., Mestre, J. M., Prevendar, T., Castelnuovo, G., & Pietrabissa, G. (2021, February 20). *The relationship between emotional intelligence, obesity and eating disorder in children and adolescents:* A systematic mapping review. MDPI. Retrieved May 1, 2023, from https://www.mdpi.com/1660-4601/18/4/2054/htm

17. Isles, J. I. (1970, January 1). *Cognitive functioning in anorexia and bulimia*. Semantic Scholar. Retrieved May 1, 2023, from https://www.semanticscholar.org/paper/Cognitive-functioning-in-anorexia-and-bulimia-Isles/8cf94f0f00178daa342926a94cebf30d8b67c053

18. It's in your blood: *Links found between blood type and risk of ...* (n.d.). Retrieved May 1, 2023, from https://www.sheffield.ac.uk/news/nr/blood-type-cognitive-disease-1.469296

19. MediLexicon International. (n.d.). *Memory loss more common in people with blood type ab*. Medical News Today. Retrieved May 1, 2023, from https://www.medicalnewstoday.com/articles/282051

20. N;, R.-M. J. P.-F. M. A. E. (n.d.). *Emotional intelligence and eating disorders*: A systematic review. Eating and weight disorders : EWD. Retrieved May 1, 2023, from https://pubmed.ncbi.nlm.nih.gov/32734465/

21. Psychiatry, aD. of. (n.d.). *Relationships among stress, Emotional Intelligence,...* : Medicine. LWW. Retrieved May 1, 2023, from https://journals.lww.com/md-journal/fulltext/2019/05030/relationships_among_stress,_emotional.21.aspx

22. Rylander, M., Taylor, G., Bennett, S., Pierce, C., Keniston, A., & Mehler, P. S. (2020, July 31). *Evaluation of cognitive function in patients with severe anorexia nervosa before and after medical stabilization* - Journal of Eating Disorders. BioMed Central. Retrieved May 1, 2023, from https://jeatdisord.biomedcentral.com/articles/10.1186/s40337-020-00312-5

23. Seidel, M., Brooker, H., Lauenborg, K., Wesnes, K., & Sjögren, M. (2021, March 5). Cognitive function in adults with enduring anorexia nervosa. MDPI. Retrieved May 1, 2023, from https://www.mdpi.com/2072-6643/13/3/859/htm

24. Støving, R. K., Nicholls, D., Neumark-Sztainer, D., Mikolajczak, M., Mayer, J. D., Markey, M. A., Hudson, J. I., He, J., Hambrook, D., Gardner, K. J., Freudenthaler, H. H., Fisher, M., Farstad, S. M., Cuesta-Zamora, C., … Francisco, R. (2021, September 4). *The relationship between emotional intelligence and eating disorders or disordered eating behaviors: A meta-analysis. Personality and Individual Differences*. Retrieved May 1, 2023, from https://www.sciencedirect.com/science/article/abs/pii/S0191886921006188?via%3Dihub

25. Sussex Publishers. (n.d.). *Inside the eating-disordered mind*. Psychology Today. Retrieved May 1, 2023, from https://www.psychologytoday.com/us/blog/everybody-is-stupid-except-you/201406/inside-the-eating-disordered-mind

26. *The strange link between blood type and Cognitive Health*. (n.d.). Retrieved May 1, 2023, from https://www.researchgate.net/publication/281411148_The_Strange_Link_Between_Blood_Type_and_Cognitive_Health

27. Vasan, S. K., Rostgaard, K., Ullum, H., Melbye, M., Hjalgrim, H., & Edgren, G. (2015, June 4). *Abo blood group and dementia risk*—A Scandinavian record-linkage study. PloS one. Retrieved May 1, 2023, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4456384/

28. Venkatesh, S., & Fischer, C. E. (2019, October 2). *Cognitive factors associated with emotional intelligence: International psychogeriatric*s. Cambridge Core. Retrieved May 1, 2023, from https://www.cambridge.org/core/journals/international-psychogeriatrics/article/abs/cognitive-factors-associated-with-emotional-intelligence/2317324A10334625E39050AB16944F7