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Research Paper

Theory of Mind and Dispositional Empathy in Young Adults

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ABSTRACT

Facial expressions play an important role in understanding emotions. Eyes are observed the most when emotions are processed. Eyes are a medium of communication in many cultures. In India, people use their eyes to express themselves, their interests, emotions, and mood. In this study, the researchers aim to observe how adults, who perceive emotions conveyed in the eyes, navigate and respond empathetically in social scenarios. The researchers will collect data from 100 adults, both males and females, between the ages of 18-25. The participants will be given the Reading the Mind in the Eyes Test (RMET) and the Interpersonal Reactivity Index through online platforms. The interpersonal reactivity index will reveal the person's empathetic disposition by measuring perspective-taking (PT), empathic concern (EC), personal distress (PD), and fantasy (F). The researchers will analyse the data using Pearson's correlation to test whether individuals who perform well in the RME test will have better interpersonal reactivity. By studying the role of eyes in recognising emotions and whether interpersonal reactivity and recognition of emotions are correlated, the researchers will try to add to the existing pool of knowledge.

Keywords: *Interpersonal reactivity, Social Cognition, Emotion recognition through eyes*

The concept of the Theory of Mind (ToM) refers to the cognitive capacity of an individual to comprehend and ascribe mental states to both oneself and others. ToM, proposed by Premack and Woodruff in 1978, is regarded as a crucial component of Social cognition. It enables humans to effectively traverse the intricacies of human relationships by perceiving and comprehending the ideas, beliefs, intentions, and emotions of others. Their pioneering work laid the groundwork for Theory of Mind (ToM) in developmental psychology. Researchers then used this model to study how individuals, especially youngsters, acquire and improve cognitive ability. This has increased our understanding of social cognition, empathy, and interpersonal relationships. Dispositional empathy is the inclination to understand and share others' feelings. Davis (1983) presented a multidimensional model of empathy that distinguished cognitive empathy (knowing another's perspective) from affective empathy (feeling another's feelings). The dispositional attribute of empathy is constant throughout time and settings. Understanding dispositional

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empathy helps explain empathetic reactions and socio-emotional functioning, especially in young adults.

Young adulthood is a crucial stage for social development, providing a favourable time to study the improvement of cognitive and emotional abilities that are important for interacting with others. Furthermore, the examination of the interaction between dispositional empathy and Theory of Mind (ToM) provides intricate understandings of social connections, communication, and empathic reactions. This study focuses on the developmental importance of these concepts during early adulthood, enhancing our comprehension of emotional intelligence and social behaviour. In addition to its academic value, this research has practical implications, notably in the fields of clinical psychology and education.

The theory of mind is an integral component of the developmental process that facilitates the acquisition of social skills and social cognition (Beaudoin et al., 2020). The absence of such abilities would result in challenges in ascertaining cognitive understanding of others' desires, motives, thoughts, and intentions, which are crucial for comprehending and anticipating behaviour in various circumstances (Beaudoin et al., 2020).

A critical review of Theory of mind has shown that deficits in the theory of mind play a role in autism spectrum disorder and schizophrenia. The concept of theory of mind, often known as "mind-reading" or "mentalizing," is utilised to anticipate and comprehend the actions of others (Leudar et al, 2004). Children, as well as people with autism and schizophrenia, encounter difficulties. Nevertheless, they are capable of maintaining active social lives. However, it is important to note that their social cognition tends to be inflexible and resistant to alteration (Leudar et al, 2004).

Mentalization, also known as theory of mind, and empathy are closely linked, exhibiting both commonalities and distinctions. Distinct neurocognitive circuits are responsible for activating the brain's capacity to empathise and mentalize (Cerniglia et al., 2019). Mirror neurons, along with specific brain regions like the cingulate cortex and anterior insula, are involved in the representation of both the emotional states of oneself and others, thereby influencing empathy (Cerniglia et al., 2019). The mentalizing process stimulates the temporal poles, temporal parietal junction (TPJ), and medial prefrontal cortex (MPFC). Conversely, the Orbitofrontal cortex (OFC) is involved in the convergence of emotional experience during the convergence of mentalizing (Cerniglia et al., 2019).

A recent study examining theory of mind and empathy found that the amygdala and insula play a crucial role in mediating empathetic responses. The findings suggest that deficiencies in empathic responses may be attributed to deficiencies in mentalization (Dvash & Shamay-Tsoory, 2014). Empathy and mentalization, albeit relying on distinct brain circuits, must be balanced to provide proper social behaviour and functioning (Dvash & Shamay-Tsoory, 2014).

The study conducted by Franca et al (2023)., used stimuli from the Ryerson Audio-Visual Database of Emotional Speech and Song (RAVDESS) dataset. The participants identified emotions by looking at the eyes of different individuals, both males and females. Different tools were administered to recognize emotions via eyes such as Reading the Mind in the Eyes Test (RMET), the Situational Test of Emotion Understanding (STEU), and SEE-48 all correlated and showed that by using eyes as stimuli, we can identify emotion perception and emotional intelligence (Franca et al., 2023).

An automated convolutional neural network-based approach was developed by Shuvo et al (2021) to identify mental states from eyes and other surrounding features. Universal emotions such as anger, disgust, sadness, happiness, fear and surprise were studied using 588 unique images of the eyes. It was found that movement of pupils, iris, eyebrows, eyelids all contributed to mental states; through understanding the eyes we can understand the human expression of emotions (Shuvo et al., 20121).

Recognition of emotions through eyes mediates social cognition and reasoning (Seo et al., 2020). Reasoning by analogy is the underlying mechanism of recognition of emotions through eyes. RMET developers have postulated that the participants map the eyes in each stimuli by preexisting information present in their memory (Seo et al., 2020). Semantic connections are made and reasoning by analogy differentiates between the eyes based on the construct present in the mind. These constructs are developed through interpersonal interactions and experiences (Seo et al., 2020). Moreover, those who are mindful and understand their own emotional state are able to identify others' emotional states by studying their eyes (Nejati et al., 2012).

Eyes play an important role in social interaction. Deficit in recognizing emotions through eyes decreases a person's social participation (Itier & Batty, 2009). Difficulties in understanding emotions via eyes leads to impaired social cognition, this includes interpreting and processing others emotions, and thoughts (Itier & Batty, 2009). It can also lead to socially inappropriate behaviour and low empathy.

Children between the ages of 6-7 years old recognize emotions better when they see the facial expressions of the entire face, however some emotions are understood better through eyes, for example, a neutral, sad or angry mental state (Guarnera et al., 2015). As children grow they become more apt at recognizing emotions through eyes alone. A comparison between adults and children shows that both groups recognize emotions best when the whole face is visible, however adults seem to detect emotions from eyes whereas there was no significant difference between eyes and mouth for children (Guarnera et al., 2017). As adults age their ability to detect emotion via eyes begin to decay (Guarnera et al., 2018). Some studies have shown that gender difference is only present in the recognition of certain emotions, where females outperform males (Vassallo et al., 2009).

Few studies have linked self-reported empathy and facial recognition ability directly. Preliminary research has indicated that people who report having higher emotional empathy also tend to be better at recognizing and understanding the emotions expressed through facial cues (Martin et al., 2003).

Researchers have found that older adults' empathic accuracy is less accurate compared to younger adult perceivers and they have difficulty in assessing emotion in young faces. They have also revealed that young emoters' emotions are easy to read compared to older emoters (Ruffman et al., 2019).

Research by Malykhin et al (2022) revealed that with age, the facial recognition of emotions will reduce. They also found that in both sexes, there was an age-related reduction in the recognition of happy emotions. While male participants showed a reduction of fear emotions, female participants showed reduced recognition of neutral and angry facial expressions.

METHODOLOGY

Research Design

A correlational study was conducted to study the relationship between Recognition of emotions through eyes and interpersonal reactivity in young adults between the ages of 18-25. Two scales were used to find the relationship between the two variables; Read Mind through Eyes test (RMET) and Interpersonal Reactivity Index. The interpersonal reactivity index consists of four subscales which independently measures perspective taking, fantasy, empathic concern and personal distress. The research was purely quantitative in nature. Participants were recruited through online platforms such as emails, WhatsApp, Instagram etc. Google form was circulated through these social media platforms to collect data.

Hypotheses

- **H0:** There is no significant relationship between recognition of emotions through eyes and interpersonal reactivity
- **H1:** There is a significant relationship between the recognition of emotions through the eyes and perspective taking.
- **H2:** There is significant relationship between recognition of emotions through eyes and Fantasy
- **H3:** There is a significant relationship between the recognition of emotions through the eyes and empathic concern.
- **H4:** There is a significant relationship between the recognition of emotions through the eyes and personal distress.

Participants

The study's participants were selected using the convenience sampling method. The study sample comprises individuals in the age range of 18 to 25 who are classified as young adults. The study comprised a group of 142 young adults. The study involved a cohort of 48 males and 94 females. 47.9% of the participants are currently registered in undergraduate degrees, and 50% are actively engaged in postgraduate studies. In addition, 16.2% of the participants are now enrolled in high school, and there is one member who is actively pursuing a doctoral study.

Tools for data collection

Interpersonal Reactivity Index

The interpersonal reactivity index was developed by Davis in 1980. The questionnaire consists of 28 items, each rated on a 5-point Likert scale that ranged from "Does not describe me well" to "Describes me very well". The measure consists of the following four subscales, each comprising seven distinct items. The first subscale measures perspective taking which refers to the natural inclination to adopt the psychological perspective of others.

Fantasy sub-scale involves the inclination of individuals to mentally project themselves into the emotions and behaviours of fictional characters in literature, films, and theatrical productions. The Empathic Concern subscale measures individuals' capacity to have sympathetic and compassionate emotions towards those who are facing adversity. Lastly, the Personal Distress subscale refers to the assessment of self-centred emotions such as personal uneasiness and unease experienced in tight interpersonal situations.

The Cronbach's alpha ranged between 0.68-0.79 and the test-retest reliability ranged from 0.61 to 0.81 (Davis, 1980). The validity has been proven in several research conducted on various populations and cultural contexts. The IRI has demonstrated strong construct validity by effectively assessing several facets of empathy. The scale comprises four subscales: Perspective Taking (PT), Fantasy (FS), Empathic concern (EC), and Personal Distress (PD). Research has confirmed the IRI's convergent validity by significant relationships with other well-established measures of empathy and related dimensions.

Reading mind through eyes test (RMET)
The Reading the Mind in the Eyes Test (RMET) is a frequently used tool that evaluates people's capacity to deduce mental states, specifically emotions and thoughts, from pictures of the eye area in human faces. The RMET, developed by Simon Baron-Cohen and his colleagues, usually includes a set of photographs that show only the eye region of different facial expressions, either in black-and-white or color. Test-takers are then prompted to choose the descriptor that most accurately matches the emotional or mental state conveyed through the eyes. The RMET aims to capture the intricate aspects of social cognition, with a focus on recognizing subtle cues that convey complex emotional and mental states. This makes it a valuable tool for assessing empathy and theory of mind.

The correlation coefficients observed in these studies ranged from 0.70 to 0.85, indicating a high level of consistency. The consistent test-retest reliability of the participant's performance on the RMET across various assessment points highlights their stable performance. Research has shown consistent test-retest reliability, with correlation coefficients ranging from 0.70 to 0.85 (Vellante et al., 2013).

Statistical Analyses
The data was analysed using the Statistical Package of Social Sciences (SPSS)-version 14.0 (SPSS Inc. Chicago). The scores of the Interpersonal Reactivity Index were reversed according to the test's established norms. The outcomes of the RMET were coded as 0 (accurate response) and 1 (incorrect response). The acquired quantitative data was summarised using statistical measures such as mean, median, mode, and standard deviation. The study employed Spearman correlation analysis to investigate the relationship between the Interpersonal Reactivity Index (IRI) and the ability to perceive emotions through the eyes. The analysis was conducted with a significance level of 95% confidence interval (CI).

RESULTS

Table 1: Showing the Descriptive Statistics

	Eyes Expression	Interpersonal Reactivity	Fantasy	Perspective Taking	Empathy	Personal Distress
N	142	142	142	142	142	142
Mean	22.68	54.53	12.35	12.78	14.64	14.75
Median	23.00	53.5	12.00	12.00	14.00	14.00
Mode	26	59	12	8^a	12	13^a
Sd	5.05	12.78	5.09	4.52	3.44	4.01

a. *Multiple modes exist. The smallest value is shown*

Table 1 illustrates the mean, median value, mode, and measure of variability (standard deviation) of the data. The mean of eye expression, interpersonal reactivity, fantasy, perspective taking, empathic concern, and personal distress are 22.68, 54.53, 12.35, 12.78, 14.64, and 14.75, respectively. The medians are 23.0, 53.50, 12, 12, 14, and 14, in that

order. The modes are 26, 59, 12, 8, 12, and 13, in that order. The standard deviation values are 5.05, 12.78, 5.09, 4.52, 3.44, and 4.01, respectively.

Table 2: Showing the Shapiro-Wilk Test of Normality

	SHAPIRO-WILK TEST OF NORMALITY		
	STATISTIC	DF	SIG.
EYES_EXPRESSION	.975	142	.011
INTERPERSONAL_REACTIVITY	.956	142	.000

a.   *Lilliefors Significance Correction*

The table 2 shows the normality scores based on the Shapiro Wilk Test of normality. The Shapiro-Wilk test for normality indicated that the p-value for the relationship between recognition of emotions through eyes and interpersonal reactivity is less than 0.05, indicating statistical significance. This suggests that the data does not follow a normal distribution, hence Spearman's correlation test was employed to analyse the data.

Table 3: Showing the Spearman correlation test

	IR_FANTASY	IR_PERSPECTIVE TAKING	IR_EMPATHY	IR_PERSONAL DISTRESS
RMET	-.142	-.159	-.176*	-.093

*Correlation is significant at the 0.05 level (2-tailed)
Note: RMET - Reading the mind through eyes test
IR_FANTASY - Interpersonal Reactivity Fantasy scale
IR_PERSPECTIVE TAKING - Interpersonal Reactivity Perspective Taking
IR_EMPATHY - Interpersonal Reactivity Empathy
IR_PERSONAL DISTRESS - Interpersonal Reactivity Personal Distress

The findings from table 3 indicate a statistically significant weak negative correlation ($\rho = -0.202$) between the RMET and Interpersonal reactivity Empathy ($\rho = -.176$). This correlation was observed at a significance level of 0.05. There is no substantial association between the ability to recognise emotions through the eyes and the sub variables of fantasy, perspective taking, and personal distress.

DISCUSSION

The present study gives a novel set of two tests assessing key components of social-cognitive functioning, namely recognition of others' mental states (Reading Mind through Eyes test) (Vellante et al., 2013) and empathic skills (Interpersonal Reactivity Index) (Bartochowski et al., 2018).

With respect to the effect of demographic factors, it can be seen that men obtained slightly higher scores (M = 56.77) than women (M = 53.38) on all IRI indexes, which is against the previous evidence that women have more interpersonal reactivity compared to men, showing different empathic skills across cultures and ages (Davis, 1983; Albiero et al., 2006; Fernandez, Dufaey, & Kramp, 2011). Also, In RMET, women (M= 23.46) scored slightly higher than men (M= 21.17), which is in line with the previous research evidence that there is no sex differences for the RMET (Serafin & Surian, 2004; Preti, Vellante, & et al, 2017). The findings of the study indicate that there is a weak negative correlation between the RMET and interpersonal reactivity and empathetic concern (tendency to experience sympathetic feelings and compassion for others who are unfortunate), which means that an

increase in RMET scores slightly decreases interpersonal reactivity and empathetic concern. The results indicate that an increase in RMET decreases an individual's ability to experience feelings of sympathy and their ability to experience compassion for others who are unfortunate. Since the relationship between the RMET and interpersonal reactivity and empathetic concern is weak, it is not conclusive that when the RMET increases, empathy decreases, and vice versa. But since the IRI scale questions were subjective (i.e., self-reported) measures, there is a possibility that some individuals might have lacked insight into their empathic difficulties, and hence the answers might have been influenced by social desirability.

This study's results are against the evidence obtained by previous studies. Emotional empathy and emotion recognition are positively correlated, meaning that the higher the emotional empathy an individual has, the higher their accurate emotional recognition (Rogio et al, 1988). The results found in this study are in-contrast to the preliminary research that has indicated that people who report having higher emotional empathy also tend to be better at recognizing and understanding the emotions expressed through facial cues (Martin et al., 1996).

Numerous variables influence empathy, including age, gender, and level of education. According to research conducted on nursing students in Bangalore, the academic achievement, job satisfaction, and career decisions of college students all have an impact on empathy. Empathy is diminished by academic challenges and job satisfaction (Rajput et al., 2020). Research focusing on young adults aged 18-25 has revealed a positive correlation between high self-esteem and empathy. Countering detrimental internal dialogue is an essential component in the cultivation of both self-esteem and empathy (Kaur, 2023).

A recent study examining theory of mind and empathy found that the amygdala and insula play a crucial role in mediating empathetic responses. The findings suggest that deficiencies in empathic responses may be attributed to deficiencies in mentalization and this could be the reason for the deficiencies in empathic responses in this study. (Dvash & Shamay-Tsoory, 2014).

CONCLUSION

Contrary to the existing literature the finding showed that there is no significant relationship between the ability to mentalize and empathise. There is a weak negative correlation between the ability to recognize emotions through eyes and the sub-variable empathic concern which suggests that increased empathic concern will decrease the mentalization ability and vice versa.

The study highlights certain constraints that require careful attention. Initially, there were unforeseen disparities in gender observed in the scores of both the Interpersonal Reactivity Index (IRI) and the Reading Mind through Eyes test (RMET). Male individuals achieved somewhat higher scores on the IRI measures, which contradicts the prevailing notion that females often display greater levels of interpersonal reactivity. This surprising discovery emphasises the necessity for more research on the intricate relationship between gender, empathy, and social-cognitive performance.

Another limitation to be taken into consideration is that the images displayed to the participants were of other racial cultures while our participants are of the Indian culture. Thus, the influence of culture can be the reason for the opposing results.

Additionally, the use of self-report measures, such as the IRI scales, presents a possible constraint due to the subjective nature of the responses and the potential for bias towards socially desirable answers. The findings of the study give rise to many potential areas for further investigation. It is crucial to investigate the cultural factors that shape gender disparities in empathy. Conducting cross-cultural research can offer useful insights into the influence of cultural environments on the development of empathic abilities and their contribution to observed gender patterns.

Engaging in longitudinal research would provide a more thorough comprehension of the correlation between RMET scores, interpersonal reactivity, and empathic concern as it evolves over time. By adopting this technique, researchers would be able to examine probable developmental patterns and more accurately depict the dynamics of these concepts throughout different periods of life.

In order to mitigate the inherent subjectivity of self-report measures, further studies might integrate objective measures of empathy, such as behavioural observations or physiological indicators.

Furthermore, incorporating additional demographic variables, such as age and socioeconomic status, into the investigation may reveal further intricacies in the association between RMET performance and empathic abilities.

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