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Mediating Effect of Anxiety on the Relationship Between Depression and Indecisiveness Through Graphological Emotional Indicators

Aqsa Yaqoob[1] (*Corresponding Author*)
Department of Psychology
University of Karachi, Karachi – Pakistan

Amena Zehra Ali (Ph.D)[2]
Department of Psychology
University of Karachi, Karachi – Pakistan

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Abstract

Depression, anxiety, and indecisiveness are the intercorrelated psychological aspects. They strongly affect the overall well-being of a person (physically and psychologically). This quantitative study aimed to examine the mediating role of anxiety on the relationship between depression and indecisiveness through graphological indicators by giving the importance of graphology in the field of mental health. It was hypothesized that anxiety would mediate the relationship between depression and indecisiveness via graphological indicators. Eighty-nine participants, with ages ranging from 19 to 38 years old, were recruited as a sample of the study through convenient sampling. A list of graphological indicators from the graphological manuals and books has been prepared to measure Depression, Anxiety, and Indecisiveness. The analysed data revealed a significant positive relationship between anxiety, depression, and indecisiveness. Further, it has been revealed that anxiety and depression positively predicted indecisiveness. Hence, it proved the mediating role of anxiety on the relationship between depression and indecisiveness via graphological indicators. Handwriting analysis, being a promising field in mental health, faces challenges that need to be targeted to develop more clear and objective tools of graphological indicators.

Keywords

Depression & anxiety

Graphological emotional indicators

Handwriting analysis

Indecisiveness

INTRODUCTION

Mental health conditions are characterized by the state of not being able to function properly in any or all of the three social, occupational, and psychological domains. In 2021, around 13.9% of the global population encountered mental problems (Batz, 2023). 1 out of every 8 people is suffering from mental health conditions. Among them depression and anxiety stand on top with prominent negative effects on one's life. They both contribute to the major disability all over the world. This prevalence has increased after the COVID-19 pandemic (WHO, 2022). The emergence of symptoms can be from childhood or adolescences with the difference in severity level without being fall into the clinical diagnosis (Bertha & Balázs, 2013), resulting in disturbed adulthood (Wesselhoeft et al., 2013). Depression and anxiety are interrelated, or bidirectional phenomenon often results in, one precedes the other (Garber & Weersing, 2010). Research shows that 90% of people with anxiety disorders also suffer from depression, and 85% of those with depression have marked symptoms of anxiety (Kalin, 2020; Tiller, 2012). Anxiety and depression have been influenced by strong genetic and non-genetic risks factors (early life adversities, such as neglect or trauma, or long-term exposure to stress). The lifetime comorbidity rates differ across distinct anxiety disorders, with social anxiety disorder exhibiting a comorbidity range of 20% to 70% with depression (Kalin, 2020).

Cognitive-Behavioural Theory posits that maladaptive thinking patterns increases indecisiveness in individuals experiencing anxiety and depression (Henkel et al., 2002). Decision-making is influenced by negative biases and rigid beliefs, which often result in depression, subsequently leading to adverse biases in self-referential processing, lack of attention, and poor memory. These biases intensify indecisiveness because of maladaptive coping strategies, such as rumination (LeMoult & Gotlib, 2019). These patterns are the examples of negative thoughts that may increase anxiety and /or depression. The poor cognitive functioning increases the indecisiveness in people (Tariq et al., 2021; Calvete et al., 2013). Cognitive vulnerabilities, such as pessimistic inferential style and maladaptive attitudes, are most common in anxiety and depression, are strong enough to initiate indecisiveness due to apprehension of adverse outcome (Hong & Cheung, 2015). Maladaptive thoughts encompass black-white thinking and unrealistic self-expectations, resulting in indecisiveness (Kovács & Beck, 1978). Indecisiveness has been found to be in people with anxiety and depression. It is explained by the hurdle in making decision often results

in low decision-making confidence and behavioural indecision (Hallenbeck et al., 2021; Lauderdale et al., 2019). The two types of indecisiveness are aversive and avoidant. Aversive indecisiveness possesses prominent connection with depression and anxiety and is characterized by the anticipation of negative results. On the other hand, decisional delay and avoidance are the features of avoidant indecisiveness (Lauderdale et al., 2019; Lauderdale & Oakes, 2021).

Depression, anxiety, and indecisiveness are the intercorrelated psychological aspects that are strongly affecting overall well-being of a person (physically and psychologically). People with depression have the strong symptom of indecisiveness, with poor self-confidence, poor concentration, and hopelessness as outcomes (Serretti et al., 1999; Hecht, 2010). The strong connection has been found between indecisiveness and anxiety disorders (including GAD and OCD). It also connected with intolerance of uncertainty, neuroticism, and avoidance, lack of cognitive flexibility, these are the common symptoms of anxiety disorders (Lauderdale et al., 2019; Lauderdale & Oakes, 2021; Oren et al., 2018). Robust research highlights the importance of graphology as a projective tool to uncover hidden aspects of personality (Asra & Shubhangi, 2017; Champa & AnandaKumar, 2010; Gawda, 2014; Mishra, 2017; Ploog, 2013; Rahiman et al., 2010). Many research studies focus on the advancement in graphology in the domain of digital analysis to improve the effectiveness of handwriting-based mental health assessments. The predictive models have been developed to assess the mental health condition like anxiety, stress, and depression by focusing on the graphological features, such as size and spacing (Pallapothu et al., 2021).

Problem Statement

Mental health conditions, such as depression and anxiety, make it difficult for people to function properly on regular basis. Indecisiveness is associated with both depression and anxiety. Early detection of these conditions becomes a vital aspect and contributing towards the improvement. There are two types of personality assessment: objective (for example, self-report measures and open or close ended interviews) and projective (for example, Thematic Apperception Test or Rorschach Inkblot Test). Objective tests are reliable and authentic but unable to control the social desirability factor. Projective tests reveal unconscious aspect of personality but seem to be ambiguous in nature and making a client or participant conscious. There is another method of personality tests which is less ambiguous in nature is Graphology or handwriting analysis.

Research Question

- Does anxiety mediate the relationship between depression and indecisiveness in adults?

Research Objective

- To investigate the mediating effect of anxiety on depression and indecisiveness in adults

Research Hypothesis

- Anxiety acts as a mediator between depression and indecisiveness in adults

Significance of the Study

The aim of this research is to validate the reliability of graphology as a measurement tool of personality traits in young adults. The projective nature of graphology serves a unique lens to interpret personality traits by evaluating writing patterns that show hidden emotional and thought processes. The use of graphology has been considered a quick and easy method to detect personality over the past few decades. Its expansion in different other fields captures the attention of researchers to validate the efficacy of it. It was hypothesized that depression indirectly affects indecisiveness through anxiety. In other words, Anxiety acts as a mediator between Depression and Indecisiveness through graphology.

LITERATURE REVIEW

Graphology has come into consideration in various industries, including psychology, education,

medicine, criminal detection, marriage counselling, business, and recruitment. Its effectiveness in revealing concealed aspects of an individual's personality that may not be evident in their outward behaviour is increasingly recognized. Efforts to create an unbiased and versatile system for graphology have emerged as an objective instrument for scrutinizing human behaviour, regardless of external attributes. By focusing on individual's letters, strokes, and portions of characters, this approach becomes representatives of personal behaviours, facilitating predictions of various actions. While numerous strategies have been proposed for employing graphology, many of these methods require human intervention for detection. The quest for a universal and automated approach to graphology becomes imperative. Some techniques have explored signatures to investigate into emotions, feelings, and personal identifications (Mishra, 2017).

Numerous studies have sought to establish its validity by comparing it to various personality tests (Dazzi & Pedrabissi, 2009; Lomonaco & Harrison, 1973). The origins of theories connecting personality with handwriting gestures are rooted in the concept of personalized graphical movement, emphasizing the uniqueness and distinctiveness of each individual's visual gestures. This concept underpins the examination of forensic handwriting documents, as graphical movement takes on specific shapes due to factors such as motor equivalence, motor memory, and psychophysiological individualization (Gawda, 2014). Emotional conflicts and psychiatric impairments have been found to affect muscular tension and handwriting pressure. While these findings might theoretically relate to the expression of neuroticism in handwriting (Caligiuri et., 2006).

METHODOLOGY

Participants

This quantitative study consisted of 89 participants age ranged from 19 – 38 years old (M = 21.97, SD = 2.47) as a sample of the study, recruited from Department of Psychology, University of Karachi, Pakistan. Participants were included in the study through convenient sampling technique (see Table 1).

Inclusion Criteria

- Participants were willing to voluntarily participate in the study were included.
- All participants were enrolled in undergraduate programs.
- Participants whose right hand is dominant in writing were included.
- All participants belonged to the middle socioeconomic class.
- Participants of birth order "only children" were excluded.

Table 1
Demographic Information (N = 89)

Characteristics		f	%
Gender	Male	17	19.1
	Female	72	80.9
Birth Order	First born	21	23.6
	Middle child	46	51.7
	Last born	22	24.7
Occupation	Student	79	88.8
	Working Student	10	11.2
Marital Status	Single	84	94.4
	Married	5	5.6
Family System	Nuclear	70	78.7
	Joint	19	21.3

Graphological Emotional Indicators

The graphological emotional indicators of depression, anxiety and indecisiveness were taken from the studies conducted by Amend and Ruiz (2000), Dresbold and Kwalwasser (2008), McNichol and Nelson (1994), and Smith (1920). Manuals and books of the above citations were used to extract the indicators of Depression, Anxiety, and Indecisiveness (see table 2 for the list). Scores for each category were assigned based on the criteria of 1 for presence and 0 for absence. The items were aggregated to obtain a composite score. A comprehensive list of items reflecting depression, anxiety, and indecisiveness has been compiled with reference to the manuals and books cited. Each variable score was assigned a scoring criterion of 1 for presence and 0 for absence. The sum of each item within each variable was calculated to derive a composite score. Numerous studies have been done to establish validity of graphology as a personality tests (Dazzi & Pedrabissi, 2009; Lomonaco & Harrison, 1973).

Table 2
List of Graphological Emotional Indicators

Depression	Indecisiveness	Anxiety	
Descending baseline	Erratic baselines	Over-taut writing	Broken loops
Uppercase t resembles letter X	T bar to the left of the stem	Unnecessary dots	Lead-in from Below Baseline
Small handwriting	Variable letter size	Variable spacing between words	Angles and Arcades (if garlands are present, they are usually flattened-out or squared-off)
t bars low on stem	Threadlike connections	Inhibited movement	Retouching
Heavy I dot	Fluctuating movement	Light pressure	Pressure Misplaced into Horizontal Dimension
Downward endings appear weak	Very reclined slant	Hesitantly drawn circle	Light pressure breaks in places
Heavy pressure	Initial stroke resting on the baseline	Heavy pressure and joined with amendments	Extreme pressure
Left narrow margin	I dot to the left of the stem	Intricate design drawn with light pressure	Cursive and printed script
Lower zone loops	Irregular handwriting	Thick and heavy strokes	Lines that descend with words
Broken or repaired middle zone letters	Very inclined	Make mistakes	Dots made of elongated dashes
I dot omitted	Inconsistent threading	Breaks in Middle Zone Letter	Short and weakly struck
	Star-Shaped Knot	Pressure exerted at the top of a letter	Punctuation carefully placed
	Primary Lead-ins	Downward motion	Final strokes descending to right
	Uneven and slow writing	Extreme Pastiosity	Extra loop in “n”
	Disconnected letters	Rhythmic Disturbance	Initial stroke resting on the baseline
	Strokes weak		

Procedure

Participants were selected from the Department of Psychology at the University of Karachi using purposive sampling after taking permission from the Chairperson and of the relevant courses. The test was conducted in a classroom setting. Participants filled out a demographic questionnaire and were given blank paper to write on. They were asked to fill out demographic information and then write a paragraph on their strengths and flaws. The aim and objective of the study were discussed with them. Upon agreement, they were requested to sign the informed consent form. They were told about the confidentiality and right to withdraw from the study at any point during the investigation. After the collection of data, participants were thanked for their voluntary participation.

Operational Definitions

Depression

Is characterized by the mood disorder which effects person's thinking patterns, emotional balance, and behaviour results in a constant feeling of sadness and lack of interest in daily routine activities or in other aspects of life. Individuals with depression experience lack of concentration, extreme guilt or worthlessness, hopelessness, helplessness, and suicidal ideation (Hammen, 2005).

Anxiety

Is an emotional tension and constant worry of future-oriented aspects of life which are not clearly identifiable threat or challenge. Also includes, physiological problems such as high blood pressure, increased heartbeat, sweating etc (Craske et al., 2011).

Indecisiveness

Rassin and Muris (2005) defined the indecisiveness as a dysfunctional personality trait characterized by a generalized difficulty to make decisions.

Statistical Analysis

Research variables were interpreted based on the list obtained from the graphology manuals and books. Data was analysed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics, correlation, regression, and mediation analysis were utilized to support the hypotheses.

RESULTS AND FINDINGS

Table 3

Correlation between Depression, Anxiety, and Indecisiveness via Graphological Emotional Indicators

Variables	Indecisiveness	Depression	Anxiety
Indecisiveness	-	.358**	.410**
Depression		-	.273**
Anxiety			-

Note. N = 89 **p < .01

Table 3 showed the significant positive correlation between indecisiveness, depression, and anxiety. Indecisiveness has shown a weak positive correlation with depression and moderate positive correlation with anxiety. Depression is also correlated with anxiety with weak but positive direction.

Table 4

Regression analysis of Depression and Anxiety as a predicting variable of Indecisiveness through Graphological Emotional Indicators

Variables	Indecisiveness				
					Collinearity Diagnosis
	B	SE	t	Tolerance	VIF
Depression	.266	.089	2.73**	.925	1.08
Anxiety	.338	.068	3.44**	.925	1.08
R	.484				
R^2	.235				
ΔR^2	.216				
F	13.12 (2, 86)**				

Note. N = 89, β=Standardized Beta, SE= Standard Error, **p < .01, df = 2, 86

Table 4 shows the results of the regression analysis, indicating that both predictors (Depression and Anxiety) showed significant effect on indecisiveness, explained 23.5% of the variance in Indecisiveness (R^2 = .235, F (2, 86) = 13.12, p < .01). The β values for Depression and Anxiety suggest that for each one-unit increase in Depression and Anxiety, Indecisiveness increases by .266 and .338 respectively. The multicollinearity diagnostics show that the VIF values for both predictors (Depression = 1.08, Anxiety = 1.08) are below 10, indicating absence of multicollinearity.

Table 5

Anxiety mediated the relationship between Depression and Indecisiveness through Graphological Emotional Indicators

Paths	B	SE	t	p	95% CI	
					LLCI	ULCI
Path a (Depression Anxiety)	.357	.135	2.64	.009	.089	.626
Path b (Anxiety ⟶ Indecisiveness)	.232	.067	3.43	.000	.098	.336
Path c (Depression ⟶ Indecisiveness) Total Effect: Before Mediation	.323	.090	3.58	.000	.143	.502
Path c (Depression ⟶ Indecisiveness) Direct effect: After Mediation	.240	.088	2.71	.008	.064	.416
Path axb (Depression ⟶ Indecisiveness) Indirect Effect: Mediation Model	.083				.001	.261

Note. N = 89, Bootstrap Sample = 5000, Bootstrap SE for Indirect Effect path a x b = .069

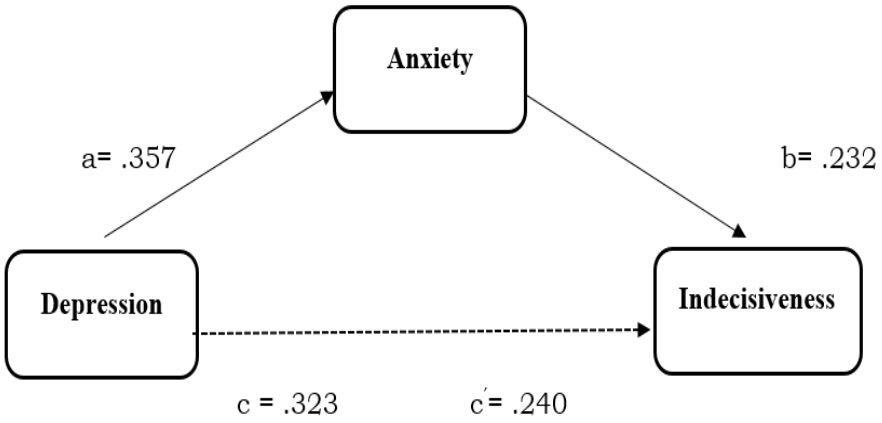

Fig. 1. Mediating role of Anxiety between Depression and Indecisiveness

Table 5 (Figure 1) showed that anxiety works as a mediator between depression and indecisiveness. In other words, depression is associated with anxiety which would then be associated with indecisiveness. The mediation model conducted (Table 4), and paths are shown in Figure 1. The model indicates that the path "a" of depression to anxiety was significant, B= .357, SE = .135, p = .009. That is, depression was associated with anxiety. Further, the path "b" from anxiety to indecisiveness was also significant, B= .232, SE = .067, p = .000, indicating anxiety was also connected with indecisiveness. Further, path "c" from depression to indecisiveness, without anxiety, was significant, B= .323, SE = .090, p = .000. The mediated model depicted the association between depression and indecisiveness is both directly via "c" pathway (relative direct effects on indecisiveness) and indirectly via the mediated "ab" pathway (relative indirect effect on indecisiveness) were significant.

Discussion

The current study focused on the mediating role of anxiety on the relationship between depression and indecisiveness by the application of graphology. The hypothesis of this study has been supported by the results of current study suggesting the significant mediating role of anxiety on the relationship between depression and indecisiveness via graphological indicators. The results align with past literature in terms of both the intercorrelation of variables and applicability of graphological indicators in assessing anxiety, depression, and indecisiveness. Depression has strong connection with negative feelings and

indecisiveness due to increased activity in right hemisphere of the brain (Hecht, 2010). Anxiety and depression are maintained by cognitive biases that lead individuals to negatively assess ambiguous situations, which in turn results in indecisiveness (Lau et al., 2021; Hallion & Ruscio, 2011). Depression, anxiety, stress (Rassin & Muris, 2005), OCD (checking and rumination) exemplifies the indecisiveness in people (Frost & Shows, 1993; Rassin & Muris, 2005). Often leads to lack of satisfaction in life and supercharge threat-oriented thought processes (Spunt et al., 2009; Rassin & Muris, 2005) in adolescents (John et al., 2022).

Graphology has taken a place in the field of Psychiatry and has become an additional tool to assess the accuracy of psychological symptoms. The difference has been found between the letters written by patients attempt suicide and healthy controls (Mouly et al., 2007). The accuracy of graphological analysis has been proved by the study conducted by Giannini et al., (2019) which shows the similarity between person does psychiatric assessment and graphologist. According to the previous literature, high stress causes pressure in the handwriting of an individual which connects with the increased level of anxiety, hence proving the relationship of pressure in handwriting with stress and anxiety. Hand-motor coordination in depression is important factor that highlights its significance by the disturbed speed patterns, suggesting the correlation of depression and hand movement. It is also useful for therapist to identify the hidden issues of the clients (Brewer, 1999). Handwriting works in response to brain activity, highlights the significance of its applicability in assessing mental health issues. Graphology, in collaboration with mental health assessment offers most cost effects and less threatening ways to reveal personality traits (Laganaro et al., 2023). Neurological and psychological disorders, such as depression, anxiety, and schizophrenia can modify the handwriting of a person result in changed letter size, slants, pressure, baseline, and spacing (Pallapothu et al., 2021).

CONCLUSION

The study of handwriting is a useful tool for finding and treating mental health problems. It has supported the predictive role of anxiety on the relationship between depression and indecisiveness in the current study. Handwriting analysis has become a fascinating way to assess mental health of a person. Thus, this is also a great approach which has the combination of brain functions and drawing skills and useful in assessing mental health challenges without being a threat.

Limitations

The study is limited to university students aged 19-38 years of age, making it difficult to generalize data or represent the population. Handwriting analysis being a promising field in mental health faces challenges that need to be targeted in order to develop more clear and objective tools of graphological indicators.

Recommendations

- It has been recommended to include data from diverse populations to improve the generalizability of the results.
- Standardized tools for Graphological indicators should be developed in order to improve the credibility of graphological assessment.
- Longitudinal studies have been recommended to assess the changes in the level of anxiety, depression, and indecisiveness and how these factors increase or reduce overtime.

Future Directions

- For future research, comparative analysis of graphological indicators would be suggested among different phases of life (e.g. adolescents, adults, and older adults).
- Graphology would be recommended to use as a pre and post assessment in Randomized control trial (RCT) of psychological intervention to assess the psychological distress and how handwriting improves post treatment.

Competing Interest

The authors reported no potential conflict of interest.

Authors' Biography

[1] **Aqsa Yaqoob** is a Research Scholar at the Department of Psychology, University of Karachi in Karachi – Pakistan. She received her Masters in Clinical Psychology from University of Karachi in Karachi – Pakistan.

[2] **Amena Zehra Ali (Ph.D)** is a Professor at the Department of Psychology, University of Karachi in Karachi – Pakistan. She obtained her Doctorate in Clinical Psychology from the University of Karachi in Karachi – Pakistan.

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