



Psychological dynamics of executive functions in university students with high anxiety trait

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Abstract

This research aimed to investigate the correlation between anxiety and executive functions (EF) among university students with trait anxiety and to clarify the psychological dynamics of their EF. Two hundred forty-three undergraduate students (Mage = 19.97 years; SD = .75) completed the State-Trait Anxiety Inventory (STAI-t) and the Behavior Rating Inventory of Executive Function, while five of them with high anxiety traits were selected to complete the Rorschach Inkblot test. The results showed that there was a statistically significant correlation between anxiety and deficiencies in the functions of initiation and shifting, working memory, inhibition, and emotional regulation, while there was no significant correlation for the other functions. The application of the Rorschach test showed that cases were characterized by complex cognitive activity that is used more defensively than in a healthy exploratory way; the cases are capable of attention, planning, and excessive control because of their dependence on the cognitive accuracy of the cards. The deficiency lies in the function of emotional regulation, which inevitably affects their development and characterizes it as heterogeneous, necessitating weakness in multiple psychological areas, without requiring deterioration or disintegration.

Keywords: Anxiety, Executive functions (EF), Psychological dynamics, University students.

Funding: The authors extend their appreciation to the Deanship of Research and Graduate Studies at King Khalid University, KSA, for funding this work through the Small Research Group under (Grant Number: RGP.1 /183/45).

History: Received: 10 March 2025 / Revised: 9 April 2025 / Accepted: 11 April 2025 / Published: 16 April 2025

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Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Institutional Review Board Statement: The Ethical Committee of the Faculty of Education, New Valley University, Egypt has granted approval for this study on 3 April 2024.

DOI: 10.53894/ijirss.v8i2.6251

Publisher: Innovative Research Publishing

1. Introduction and Theoretical Background

Anxiety has remained a fertile area for further study, especially after social media and other forms of digital technology have imposed new social standards and expectations not only for adults and the elderly but also for younger age groups, promoting social comparisons and self-doubt [1] which has reinforced the raw material from which all neurotic symptoms are made and has reinforced a currency that is substituted for all emotional states, or can be substituted for them when their mental content is repressed, namely anxiety [2].

Therefore, the relationship between anxiety and emotional aspects is well established. However, the connection between anxiety and executive cognitive performance remains under study [3], yielding inconsistent findings [4]. Some studies suggest that anxiety impairs executive functions, particularly shifting and inhibition [5, 6], while others argue that anxiety may enhance cognitive adaptability in threatening situations rather than causing distraction [7]. Research also indicates that test anxiety can improve cognitive performance through memory updates without impairing working memory, though it increases mind-wandering [8-10]. Thus, our understanding of the role of trait anxiety in executive functioning remains limited [11].

The conflicting results regarding the correlation between executive functions (EF) and anxiety, as well as the specific functions linked to anxiety, highlight the need for further investigation. This study aims to explore the relationship between anxiety and EF, particularly considering recent theoretical shifts in clinical, psychological, and neurological research, which emphasize the connection between psychological disorders and cognitive functions, with EF being a central focus. Given this, it is crucial to assess the relevance and validity of the Rorschach test, one of the most widely recognized psychological assessments, even after nearly a century of use in detecting EF [12].

EF serves as an overarching framework for essential skills required in daily life. They help individuals plan, organize behavior, anticipate future actions, complete tasks, sustain attention, achieve long-term goals, and make decisions. Additionally, EF supports cognitive flexibility, problem-solving, and self-monitoring of thoughts and emotions to enhance efficiency [13, 14].

Theoretical approaches to studying EF have varied. Luria's model posits that the human brain consists of three units: the first, primarily in the brainstem, regulates and organizes cortical arousal; the second encodes, processes, and stores information [15, 16].

Barkley proposed a model explaining EF through self-regulation, emphasizing two core factors: inhibition, which involves controlling motor, verbal, cognitive, and emotional responses, and the metacognitive factor, which includes non-verbal and verbal working memory, planning, problem-solving, and emotional self-regulation. He argued that behavioral inhibition is the central executive process organizing other executive functions [17].

Wells introduced an EF model based on self-regulation, suggesting that psychological disturbances arise from metacognitions that trigger maladaptive responses to internal states, maintaining negative emotions and thoughts. This pattern, termed cognitive attentional syndrome, is marked by self-focused attention, activation of negative self-beliefs, excessive worry and rumination, threat monitoring, ineffective self-regulation, and coping styles that hinder adaptive self-awareness [18].

Sohlberg and Mateer presented a model of executive function (EF) that includes six components: intention and motivation (activating or initiating a cognitive system), response inhibition (stopping an automatic response), persistence on task, organization, generative thinking (creating multiple solutions to a problem and thinking about them flexibly), and awareness (monitoring and modifying behavior) [19].

The information processing theory dealt with EF and assumed the limited performance of the mind for different mental processes, and that the executive processes are what determine which processes will operate and when, and they called them control or procedural control processes, and these processes are responsible for stimulating cognitive activities, directing them, and employing them in an effective economical manner; as they evaluate the situation and determine appropriate strategies [20].

These theoretical approaches agree on the importance of EF, and their disturbance is linked to some psychological disorders, including anxiety, in a way that affects many cognitive, social, academic, professional, professional, professional, and psychological aspects of individuals [5, 21, 22]. Therefore, assessing executive function disorders has important clinical and therapeutic implications, especially regarding anxiety, which remains a central point at which various types of issues of the greatest importance meet, and it has still been a puzzle whose solution sheds light on our entire psychological life [2].

Anxiety has two aspects: trait anxiety and state anxiety. State anxiety is a temporary emotional response to threatening situations and is characterized by subjective feelings of tension. Trait anxiety refers to the general tendency to respond anxiously to perceived environmental stressors and is a relatively stable characteristic of the individual [23]. The current study focuses on trait anxiety in university students, which represents the human force on which the burden of society and its challenges falls. Therefore, the future must be viewed in terms of the integrity of its structure, which depends on the integrity of the structure of this force.

Anxiety involves, above all, a specific group of motor innervations or discharges, followed by special sensations. These sensations are of two types: one that organizes the perception of motor actions performed by the individual, and another that includes the pleasant and unpleasant sensations that imbue the emotional state with what we call its predominant "tinge" [2].

Although the predominant feature of anxiety is the emotional state, the relationship between anxiety and the cognitive and executive aspects has not received sufficient attention [24].

Studies conducted in this field also had conflicting results [25]. For example, Billingsley - Marshall et al. [26] found that individuals with high levels of anxiety had deficits in their executive function (EF) [26], and Bredemeier found that the

degree of impairment in EF is related to the severity of anxiety symptoms [27], while the study of [28] did not find a relationship between anxiety symptoms and deficits in EF [28].

In this context, many studies have been conducted that have dealt with trait anxiety and its relationship to EF. The study by Gunther et al., aimed to examine performance on attention and memory tasks among a sample of children and adolescents aged 6 to 17 years who suffer from anxiety (n=34), depression (n=31) and a group of normal people (n=33) and were evaluated using a comprehensive neuropsychological battery. The study found that children with depression and anxiety suffer from deficits in verbal memory, but do not suffer from attention deficits [29].

Greenwald and Carr [30] found no negative correlation between working memory, IQ, and anxiety, depression, or attention problems. However, their results indicated that increased learning difficulties were linked to declines in working memory and intelligence, underscoring the impact of learning problems on cognitive abilities [30]. Similarly, Alfonso and Lonigan [31] reported a statistically significant positive correlation between trait anxiety and EF, identifying working memory as a mediator between trait anxiety and academic achievement. Their findings suggest that trait anxiety may enhance working memory, thereby improving academic performance in adolescents [31].

This aligns with [32] who found that trait anxiety slows processing speed, with higher anxiety levels leading to longer response times. However, they observed no significant effect of trait anxiety on specific EF in a non-clinical sample [32]. Likewise, [33] discovered that university students with high trait anxiety exhibited an early differentiation between self-related and unrelated stimuli, suggesting heightened vigilance and increased sensitivity to self-relevant information [33].

The discrepancy in study results regarding the correlation between EF and anxiety may stem from variations in sample characteristics, anxiety severity, and assessment methods. Some studies have struggled to capture the multifaceted nature of EF, which consists of three distinct yet interconnected processes: inhibition (suppressing automatic responses to irrelevant stimuli), shifting (flexibly switching between tasks), and updating (integrating new information while discarding outdated content from working memory) [34, 35].

Additionally, some experimental studies have examined these aspects in isolation and generalized deficits in specific functions to represent overall EF impairments, which may not accurately reflect their multidimensional structure. Others have adopted a unidimensional approach, using a single task to assess multiple EF components, failing to account for construct-specific variance in EF models [36].

Therefore, this research aims to explore the relationship between EF and anxiety in a non-clinical sample of university students, shedding light on the dynamics of their executive functioning.

1.1. Research Problem

Anxiety is characterized by unfounded fear and tension [37] and is a common symptom in psychological disorders, negatively impacting social performance, self-esteem, and physical health [38]. However, the relationship between anxiety and EF deficits remains controversial. While some studies link anxiety to EF impairments [39], others report no significant differences between individuals with anxiety and those without [40, 41]. In contrast, some findings suggest that trait anxiety may even enhance working memory performance [31, 42].

Regarding shifting ability, research has also produced mixed results. Some studies associate trait anxiety with poor shifting efficiency [43, 44] while others find no negative effect [45]. [46] suggest that the impact of trait anxiety on shifting depends on task demands [46]. These inconsistencies indicate that trait anxiety may not only have a minimal effect on cognitive performance [42] but could also lead to compensatory strategies that enhance performance [47, 48].

Given these conflicting findings, the current study seeks to clarify the relationship between anxiety and EF by considering their unity, integration, and diversity in personality formation. This research examines the psychological dynamics of EF—i.e., the interactions of underlying forces influencing thoughts, emotions, and behavior [49] —through the Rorschach test, known for its ability to assess personality structure and cognitive-emotional regulation.

From the above, the research problem can be formulated in the following main question: What are the psychological dynamics of EF among a sample of university students with high anxiety traits? The following two sub-questions branch out from this question:

What is the nature of the correlation between EF and the trait of high anxiety?

What is the possibility of the Rorschach test in determining EF in university students who suffer from a high anxiety trait?

1.2. Research Objectives

Explore the nature of the correlation between EF and the trait of high anxiety.

Detect the dynamics of EF among university students with high trait anxiety through performance on the Rorschach test.

1.3. Research Importance

There is a clear fundamental discrepancy in the results of studies that deal with the nature of the relationship between anxiety and executive function (EF). Thus, the study contributes to supporting some results but not others and contributes to theoretical and applied enrichment.

The importance of the research stems from the need to clarify the nature of the relationship between EF and anxiety through the clinical approach and to clarify whether this deficiency is exceptional (or strong) in a specific dimension of executive function in order to sharpen initiatives to address executive function in clinical applications and practices, and to benefit from this in psychological counseling programs for emotional disorders in general.

Anxiety is not only linked to pathological conditions, but is also linked to normal behavior, and thus diagnosing the onset of anxiety makes therapeutic intervention fruitful, preventive, and important before the condition becomes so stable that intervention or treatment is no longer possible.

1.4. Research Terminology

1.4.1. Dynamic:

The study of phenomena as the result of mutual and opposing influences between forces, and the study of phenomena not in terms of their being individual phenomena, but rather their study in the language of growth processes, ascension or regression [50].

1.4.2. Executive Functions:

EF is a general umbrella that includes a group of skills and higher cognitive functions with a goal that can be distinguished from each other, yet they remain interconnected. They enable the person to recognize his personal behavior and evaluate the suitability of this behavior to the interaction situation in which he is present and then modify or change this behavior if the interaction situation requires it, Lepach et al. [51]. The main components of EF include anticipation, distribution of attention, impulse control and self-regulation, initiation of activity, working memory, mental flexibility, benefit from feedback, the ability to plan and organize, and the ability to choose effective strategies to solve the problem. EF is not limited to cognitive processes only but also includes emotional and behavioral responses [52].

The researchers define EF as "a group of cognitive, emotional, and behavioral functions that include the ability to inhibit, self-monitor, plan/organize, shift, initiate, task monitor, emotional control, working memory, and organization of materials."

1.4.3. Trait anxiety:

Al-Behiri [53] refers to anxiety as a relatively stable personality trait, with people varying in their degree of anxiety and according to their previous childhood experiences [53].

1.5. Research Hypotheses

There is a statistically significant correlation between anxiety and EF in the research sample.

The dynamics of EF in university students with high trait anxiety can be revealed through performance on the Rorschach test.

2. Method

2.1. Design

The researchers used the descriptive and clinical approach; the descriptive approach to clarify the correlation between anxiety trait and EF, the clinical approach to clarify psychodynamic issues of executive functions in students with high anxiety traits, and to provide data about the different areas of personality functioning, such as motivations, response tendencies, cognitive operations, affectivity, self-perception, and personal/interpersonal relationships of an individual.

2.2. Participants

A total of 243 undergraduate students (102 males and 141 females) were recruited from the faculty of education in the New Valley university; their ages range from 18 to 22 years (M_{age} = 19.97 years; SD = .75) completed the measures outlined below. Five female students with high anxiety traits were selected to complete the Rorschach Test.

2.3. Instruments

2.3.1. State-Trait Anxiety Inventory (STAI-T)

The trait version of the State-Trait Anxiety Inventory (STAI-t; Spielberger et al. [54] Arabic version, adapted by Al-Behiri [53] is a 20-item test created to assess cognitive and somatic components of anxiety as a general personality trait. Higher scores reveal higher levels of trait anxiety. The adapted version of the scale conducted test-retest reliability on a sample of (1057) patients, and healthy university and postgraduate male and female students. The Cronbach's alpha for the trait anxiety scale ranged from (.69-.71). The split-half method was used, and the reliability coefficient of the trait anxiety test ranged from (.80-.92). To calculate the validity, concurrent validity was used, and the reliability coefficient was from (.50-.77). The validity of the hypothesis construction and factor analysis were used.

The Behavior Rating Inventory of Executive Function — Adult Version (BRIEF-A) [55] (Translated and adapted by Shuwaikh [56].

The BRIEF-A was originally developed in Roth et al. [55] and adapted to Arabic [56] on a sample of Egyptian adults of (1.026) participants. The BRIEF-A is a standardized measure that gathers data on an adult's own perception of their own executive function or self-regulation in their daily environment. It consists of 75 items that form nine clinical scales that measure various aspects of executive functioning: Inhibit, Self-Monitor, Plan/Organize, Shift, Initiate, Task Monitor, Emotional Control, Working Memory, and Organization of Materials. These clinical scales form two broader indexes: Behavioral Regulation (BRI) and Metacognition (MI), and these indexes form the Global Executive Composite (GEC). Three validity scales (Negativity, Inconsistency, and Infrequency) are also included in the BRIEFA. Completing the BRIEF-A takes 10-15 minutes. Respondents select one of three options: "never (0)," "sometimes (1)," or "often (2)" to indicate how frequently each item has caused them problems over the last month. Higher scores signify more difficulties with executive function.

The Arabic version reached results like the foreign version in terms of validity and reliability. The internal consistency coefficients for the nine dimensions ranged between (.76 - .90), all of which were statistically significant (**p<.01), and ranged between (.75 - .91) for the sub-dimensions. This was also confirmed through factor analysis of battery dimensions.

In the current research, the researchers based the psychometric properties of the BRIEF-A on a previous study on a similar sample, which has demonstrated good internal consistency, validity, and reliability [57].

2.3.2. The Rorschach Test: [58]

The Rorschach [58] consists of ten pictures, each of which consists of identical shapes, as happens when we drop a large ink dot on a white sheet of paper, then apply the paper and press on it slightly, and different identical shapes emerge. Although the Rorschach cards may have arisen accidentally, the ten images that make up the test were chosen from a very large number of images, and Rorschach kept these ten images because they elicit as many different responses as possible in different people. The order in which these images are presented to the subject is determined by Rorschach's desire to introduce a psychological system that would ensure that the subject's arousal remained at the highest possible level. Five images consist of shades of different shades, two other images are black and red, and the remaining three consist of multiple colors other than black [59]. The research in applying and interpreting the test was based on the Klopfer and Davidson [60].

2.4. Data analysis

The collected data were analyzed using SPSS ver.25.

3. Results and Discussion

This first hypothesis stated: "There is a statistically significant correlation between anxiety and EF in the research sample." To test the validity of this hypothesis, the correlation coefficient (Pearson method) was calculated between the raw scores of the study sample members of university students on the anxiety scale and the EF battery (total score and subdimensions). Table 1 shows the results of this.

Table 1.

Correlation coefficients between the scores of the study sample members on the anxiety Scale and the EF Battery (n=243)

Executive Functions	Anxiety
Planning	-0.114
Working memory	-0.446**
inhibition	-0.516**
shifting	-0.523**
emotional control	-0.718**
Self-monitoring	-0.098
Initiation	-0.257**
Task-monitoring	-0.110
Organizing things	-0.541**
Total score	-0.770**
Note: **= < 01	

Note: **p<.01.

Table 1 reveals a statistically significant correlation between anxiety and deficiencies in initiation, shifting, working memory, inhibition, and emotional regulation, while no correlation was found between anxiety and deficits in planning and self/task monitoring.

These findings align partially with prior research. Ursache & Raver linked trait anxiety to EF deficits [6] while Ng & Lee found that trait anxiety specifically impairs working memory [61]. Similarly, Ajilchi and Nejati [24] reported slower response times in attention, shifting, and cognitive tasks among individuals with anxiety Ajilchi and Nejati [24]. Qi et al. [62] highlighted emotional regulation deficits in individuals with trait anxiety [62], which Yang et al. [63] identified as a key risk factor for internalizing disorders, including anxiety [64].

The observed deficiencies in emotional regulation and inhibition among those with high trait anxiety may stem from the relationship between anxiety and inhibition, which impairs the ability to utilize emotional regulation strategies [65]. This is consistent with Pini et al. [66], who found that increased behavioral inhibition correlates with anxiety, and Jiang et al., who observed reduced attention spans in anxious individuals, leading to avoidance of threatening social cues [67]. This avoidance can be explained by the behavioral inhibition system (BIS), which becomes activated in response to punishment, unfamiliar experiences, or negative events, driving individuals to avoid distressing situations, ultimately affecting emotional regulation.

The lack of deficits in planning and monitoring among those with trait anxiety may be attributed to their self-evaluation tendencies, which differ significantly from individuals with low anxiety [33]. This could lead them to adopt compensatory strategies to enhance performance [47]. Additionally, university students' tendency to engage in critical thinking, evaluate information, and retain knowledge beyond rote memorization [57] may contribute to maintaining intact planning and monitoring functions despite anxiety.

Another possible explanation relates to introversion, as anxiety is often associated with internalizing disorders and traits of introversion Robinson et al. [68]. Exner et al. [69] found that introverts, while slow and contemplative in problem-solving, demonstrate greater organization and precision in decision-making [69]. Their methodical approach compensates for slower processing speed by using fewer cognitive resources to achieve goals effectively.

This interpretation aligns with recent studies showing that high anxiety is significantly associated with longer response times (reduced efficiency) but not with decreased performance accuracy [70].

The second hypothesis states that "the Rorschach test can be used to reveal the psychological dynamics of EF in students with high anxiety traits." To verify this hypothesis, five female students with high anxiety traits were selected. Their average score on the anxiety test was 52. A meeting was scheduled, which consisted of two sessions. The first session was to collect data and possible information about the case by learning about the history of the case, the personality type, and the relationships with parents and siblings. In the second session, the Rorschach cards were administered, and the protocol for each case was corrected and interpreted to identify the dynamics of their EF. Below are the results of the second hypothesis and its interpretation according to the Klopfer method.

The reaction time and the number of responses. The reaction time is not very far from the normal limit, which ranges from 15-20 seconds, as mentioned by Rorschach. The average reaction time in the cases was (19.6) seconds, and therefore it falls within the normal limits. If we link this to the relative increase in good form, this may be due to the presence of comprehensive mental productive capacity, and to the fact that the cognitive understanding of the cards is sharp and accurate with the ease of associative processes that provide the case with speed of responses. It has also become clear that some case responses are characterized by a high reaction time of up to (55) seconds, which indicates the conflict between inside and outside, , with the former prevailing over the latter., and others are characterized by a low reaction time of up to (four seconds), which indicates haste and lack of patience in some situations, reluctance to deal with the outside world, and conflict between suppressive forces and impulses. This conflict sometimes causes weakness in the attention process. The average reaction time for achromatic cards was (24.22 seconds) and for chromatic cards (23.20 seconds).

Although the time of the achromatic cards is higher than that of the chromatic cards, which indicates the presence of difficulties in mental efficiency, the difference between them is small, which indicates that these difficulties are caused by the outside world and the possibility of emotional arousal interfering with thinking. This is confirmed by the difference between the largest reaction time and the lowest reaction time, as it indicates to neurotic traits and the tension, anxiety, and disturbed feelings that accompany them. This is consistent with the study of Eysenck and Byrne [71] who found that individuals with high trait anxiety are quicker to respond to negative emotional cues and take longer to name the colors of negative emotional words.

The results also indicated that the average number of case responses was (14), which suggests a weak production capacity for cases. It is important to draw attention to the fact that the cases gave several responses in the investigation stage that could have raised the EF if they had been given in the association stage, and this represents a type of latent element in the subject's personality that is not ready to act automatically and directly. This suggests that individuals with trait anxiety suffer from early processing aberrations [32] and that they have hypervigilance towards self-related stimuli [33].

Estimates of the place. When looking at the average of W's responses, we find that they amounted to (4.1), and by calculating the percentage of these responses in relation to the total number of responses, which amounted to (14) responses, we find that they amounted to (29.3%), and the expected percentage of these responses is from 20% to 30% [60]. This indicates their ability to plan, and this is consistent with the results of the psychometric hypothesis. However, the high percentage of detail responses (D), which amounted to (57.8%), indicates the tendency of anxious individuals to be interested in non-abstract and practical tasks whose performance or execution does not require recourse to theoretical laws [59]. The presence of space responses (S), which averaged (.26), indicates a state of psychological tension among the cases and the environment, and this is confirmed by the appearance of responses (d) in all cases, which indicates anxiety accompanied by the individual's desire to alleviate its severity, the d response is reaffirmed as criticalness and interpreted if overemphasized as "an insecurity against which the individual defends himself by clinging to limited areas of certainty for fear of losing his bearings" [72, 73].

The Form factor is also related to accuracy. The average responses of individuals reached (30.4%), and this percentage falls within the expected normal range of (20 to 50%). However, the percentage of responses for distinct shapes and shading (FK + F + Fc) reached 44.1%. This percentage does not exceed the normal range of 50-75%, which indicates that the control function may be somewhat deficient due to a weakness in establishing close contacts with others.

The ratio of Form responses also indicates a personality that responds strongly to emotions, is excessively integrated with the complexities of the stimulus, and is unable to retreat from situations that require emotional stimuli if it is integrated into them, which makes it unable, after integration, to regulate and modify its emotions [74].

The cases also responded in a successive order that included the same place, the same content, the same location, and the same common response without any other treatment. These responses reflect a kind of cognitive inflexibility and difficulty in the process of shifting the cognitive outlook, resulting from the inability to develop appropriate social skills. This is consistent with the results of the psychometric hypothesis.

Estimation of movement. The decrease in the number of responses to (M), as the average of movement responses reached (.8) among those with high anxiety trait, suggests that the cases suffer from difficulty in mutual personal relationships, and this is due to the presence of an emotional block represented by a lack of empathy and emotional harmony with the other. This suggests that there is an additional (M) response that indicates that the actual potential energy is not being used, perhaps due to repression. Thus, those with high anxiety traits suffer from a deficiency in the process of emotional regulation. The presence of negative motor responses (sleeping, thinking, contemplating) in the state protocol indicates a specific form of intellectual disorganization resulting from self-focused attention and fear of negative evaluation [63, 75]. Such self-focus may prevent proper awareness of external events, which sometimes contributes to intellectual disarray and thus contributes to a person's reticence.

The results also indicated that FM + m is more than 1.5 M, which indicates that the strong tensions experienced by cases suffering from anxiety are in a way that does not allow them to use internal resources in a constructive manner.

The average response to animal movement (FM) was (3.4), which indicates the frequency of destructive and aggressive tendencies and the expression of oral needs resulting from not meeting basic needs such as security, love, and appreciation [76]. This is confirmed by the response of inanimate movement (m), which indicates aggression and destructive tendencies. Inanimate movement also represents internal or external forces that the individual cannot control and thus threatens himself, and he is aware of these forces. It also indicates the need for repression. It indicates mental distraction and cognitive excitement [77]. Therefore, an increase and exaggeration in inhibition function in people with high anxiety trait can be inferred through movement estimation.

Estimates of color and shading: The researchers noticed a decrease in the responses of (FC), and this indicates their lack of control over emotional influences and their inability to establish smooth relationships with others. Also, the ratio of FC: (CF + C), which ranged between (.7 and 1). indicates a weak ability to control the emotions experienced by the cases. The lack of responses to shading and the emergence of more responses related to texture, such as "fur", reveal the deep personal emotional needs of the cases, such as the need for love and security. It also indicates their weak clairvoyance, but it can be strengthened, and this is confirmed by the (FK) response with additional information. Therefore, the function of emotional regulation can be inferred from color estimates.

This is consistent with the study of Slavin-Mulford et al. [78] who found that individuals suffering from anxiety tend to frequently use shadow responses that reflect a type of texture (T), which indicates a need/desire for external calming, and they tend to focus ruminatively on negative aspects of the self, which appeared in the three-dimensional response or depth like Vista (V) maps. These findings demonstrate the characteristic emotional deficits of individuals with generalized anxiety disorder and their corresponding reliance on compensatory mechanisms such as re-seeking reaffirmation and feelings of reassurance. This weak ability to control the emotions was reflected even in the childhood stage as the study of Teleb and Diab [79] found that anxious children produced fewer sum C responses and a lower affective ratio, higher morbid responses, which reflect emotion dysregulation.

Ratios related to the balance between inner extroversion and extroversion: The results indicated that cases suffering from anxiety tend towards inner extroversion, which appeared from the larger ratio (FM + m) (Fc + c + FC~). This indicates a weaker relationship between the ego and the other and aggression against it. It leads to aversion to it and a tendency towards internal extroversion, as well as indicating surrender and withdrawal when facing problems, and this is consistent with the study of [80, 81] who found that those with trait anxiety are incompetent when dealing with stress. It is consistent with the study of Yang et al. [64], which found that those with internal disorders, including anxiety, suffer from difficulties in controlling attention and emotion, which leads to behavioral difficulties.

The analysis of five cases with trait anxiety highlights distinct EF dynamics. Findings from the Rorschach test suggest that these individuals exhibit complex cognitive activity, used defensively rather than exploratorily, with strengths in attention, planning, and cognitive control but deficits in emotional regulation, inhibition, initiation, shifting, and working memory. These deficits, however, do not lead to cognitive deterioration but rather indicate a heterogeneous EF profile with nonlinear and asynchronous development.

This pattern aligns with Wells' Cognitive-Attentional Syndrome (CAS), characterized by excessive metacognition, self-focused attention, and threat monitoring [18]. While cognitive development remains relatively balanced, the interplay between EF and anxiety appears complex. Anxiety manifests as insecurity, expressed through fear, low self-confidence, shyness, hypersensitivity, and excessive control. This results in either emotional suppression or heightened emotional reactivity, leading to rigidity and difficulty in emotional adaptation.

Psychometric and clinical findings indicate an expanded self-concept, leading to over-monitoring of mistakes and excessive emotional regulation. This hyper-control contributes to cognitive inflexibility, emotional disorganization, and reduced adaptability, reinforcing the intricate link between anxiety and EF.

Therefore, we can conclude that all human aptitudes, including EF, are completely similar in terms of quality, so they do not differ from each other except in terms of their quantitative proportions. The effect of anxiety on EF depends on the quantitative dominance of one function over another. This quantitative factor is no less important and dangerous in terms of the individual's ability to resist psychological illnesses [50], and every executive function works at maximum capacity (quality), but what generates disorder is that this function desires to avoid or integrate with much more than its needs (quantity).

From the above, the researchers concluded that the active impact of anxiety, negatively or positively, on EF depends on the dynamics from within, the equality of forces, and the ego in the traditional sense. It also depends on the field in which anxiety occurred, the extent of tolerance, the extent of acceptance, and the extent of deprivation.

4. Limitations

Although scientific research into anxiety has increased dramatically over the past years, and as a result, we now have far greater knowledge about key characteristics, risk and maintaining factors, treatments, and prevention of these highly prevalent disorders, the field still has a long way to go. For example, the current research relied on a sample of non-referred university students, so it is important to note that the results may not fully represent all anxious individuals in the local population. Additionally, the generalizability of the results was further restricted by the fact that other comorbidities, such as depression or personality disorders, were not distinguished among the participants.

5. Conclusion

The present study examined the psychological dynamics of executive function (EF) in university students with high trait anxiety using a mixed-methods approach. The results revealed significant correlations between trait anxiety and deficits in initiation, shifting, working memory, inhibition, and emotional regulation, while no significant associations were found with planning, self-monitoring, or task monitoring.

Through the Rorschach Inkblot Test, the study identified distinct cognitive and emotional patterns in highly anxious individuals. These individuals demonstrated heightened cognitive control and attention to detail but experienced difficulties with emotional regulation, which impacted their adaptability and cognitive flexibility. The findings underscore the heterogeneity of executive function dynamics, illustrating how anxiety affects cognitive and emotional domains in complex ways.

This research contributes to a deeper understanding of the relationship between anxiety and executive function (EF), offering valuable insights for clinical and educational applications. However, its scope is limited to a specific sample, highlighting the need for future research to explore diverse populations, longitudinal designs, and broader cultural contexts. Additionally, integrating targeted interventions could help individuals with high anxiety traits improve EF performance and emotional well-being.

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