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The Utility of Rorschach Inkblot Test in the Assessment of Executive Functions in Children with Trait Anxiety

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Abstract

Despite the psychosocial nature of the difficulties that anxious children experience, limited research has utilized projective tests to examine the dynamics of their executive functions. This research aimed to investigate and compare the executive functions of children with trait anxiety with those functions in healthy ones utilizing the Rorschach Inkblot Method (RIM). The research sample consisted of 285 participants who were recruited from the fifth and sixth grade in the schools of El-Kharga in the New Valley Governorate, their ages range from 11 to 12 years (M_{age}= 11.61 years; SD = .28). They were screened using the State-trait anxiety inventory (STAI-t). Based on the scores of the primary sample on the STAI-t and using a random method, (9) children were selected as a group experiencing trait anxiety (anxious children), while (11) children were selected as a group not experiencing trait anxiety (normal children). Next, both groups were compared using the Rorschach. Results showed that anxious children differed from normal children in the function of flexibility and organization which is reflected through their information processing. Anxious children also differed from normal children in the function of planning, decision making and problem solving, which was reflected through the capacity for coping with stress. Anxious children produced fewer sum C responses and a lower affective ratio, higher morbid responses which reflect emotion dysregulation as seen from affect and self-perception.

Keywords: *Rorschach Inkblot Test, Executive Functions (EF), Trait Anxiety, Children.*

1. Introduction and Theoretical Background

Anxiety in children continues to occupy a significant amount of effort of researchers, professionals, educators, and parents, as they attempt to provide help for children who struggle with this problem. The World Health Organization (WHO) estimates that anxiety is the most common psychological condition, affecting 5.7% to 17.7% of children and adolescents (Mohammadi et al., 2020).

Research on anxiety has distinguished between state anxiety— the current experienced degree of anxiety— and trait anxiety— stable anxiety predisposition tendency and a component of a personality dimension associated with emotional instability (Eysenck, 2000). Spielberger et al. (1983) defines state anxiety as a temporary emotional reaction, composed of feelings of tension and worry produced by experienced distress. On the other hand, trait anxiety refers to an individual's personality and tendency for anxiety. In the present research, we focus on trait anxiety, the personality dimension that includes a temperamental predisposition to experience a negative mood in various stressful and non-stressful conditions. As the risk of anxiety disorder is higher in childhood, therefore, early diagnosis of the condition is essential for managing anxiety and its effects in later life (Beesdo et al., 2009).

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The prevalence of anxiety has a detrimental and long-lasting effect on a variety of areas of children and adolescents' lives, including cognitive, behavioral, and social functions (Mohammadi et al., 2020). Studies conducted on children have demonstrated a relationship between trait anxiety and executive function (EF), which is a multidimensional concept that is considered to be the higher order cognitive processes involved in complex goal-directed behaviors connected to the prefrontal cortex's development and function in both activating and inhibiting other brain regions (Garon et al., 2008).

Snyder et al. (2015) state that EF are cognitive processes which regulate perception and motor reactions, which enable people to plan, assess risks, break habits, and adapt to new circumstances.

Although previous studies in the past have linked low executive functioning (EF) to trait anxiety, not much has been done to investigate EF through projective tests like the Rorschach Inkblot Test. This research aims to investigate the EF of children with anxiety as seen on the Rorschach Inkblot Method (RIM), a technique that is commonly applied as a component of a comprehensive psychological assessment.

According to studies on EF with children the dimensionality of EF appears to be developmental, with greater complexity emerging over time (Alfonso & Lonigan, 2021). For this reason, we selected the Rorschach Inkblot test, which focuses on the idea that both conscious and unconscious ways of feeling and thinking—specifically, cognitive, perceptual, affective, problem-solving, and coping resources—are reflected (projected) on the test's ambiguous materials, providing information about the individual's functioning in the present (McGrath, 2008). Chandler (2003) stated that the Rorschach test offers precise information on normal or abnormal behavior with regard to the evaluation of children. According to his view, the test offers comprehensive data that may be used to represent the testes' behavioral and cognitive inclinations in normal and abnormal ways. It could also reflect one's ego strengths and worries or anxieties.

Clarifying EF in anxious children may lead to important consequences for the diagnosis, and management of children's anxiety. Our research therefore aimed at evaluating EF in children with anxiety using the RIM. Consistent with this aim, the following hypothesis was tested: EF of anxious children would be differed from EF of normal children according to RIM variables.

2. Research Problem

The executive functions in anxious children, assessed through the Rorschach Inkblot Test, involve higher-order cognitive processes crucial for purposeful thinking and behavioral control. The Rorschach Inkblot Test is designed to evaluate their ability to adapt to changing rules, prioritize tasks, and control attention. Anxious children may face challenges in rapidly adjusting to rule variations during the Rorschach Inkblot Test, impacting their problem-solving strategies.

The current research problem can be formulated in the following main question: What are the executive functions in anxious children compared with normal children as assessed through the Rorschach Inkblot Test?

3. Research Objective

The current research aims to identify the executive functions in anxious children and compare them with typically normal children using the Rorschach Inkblot Test.

4. Research Importance

The use of the Rorschach Inkblot Test to identify executive functions in anxious children holds significant importance for several reasons:

4.1. Assessment of Rapid Adaptation: The Rorschach Inkblot Test measures children's ability to quickly adapt to changes and shifts in their environment. Anxious children may exhibit difficulties in this aspect, and the test helps examine the impact of anxiety on their adaptability.
4.2. Evaluation of Cognitive Flexibility: The test reveals the extent of children's cognitive flexibility and their ability to adapt to changes in rules and circumstances. Anxiety can influence cognitive flexibility, and the test assesses the extent to which children can cope with these challenges.
4.3. Analysis of Organizational and Planning Skills: The test highlights children's skills in organization, planning, and setting priorities. This aids in assessing their ability to organize thoughts and behavior effectively, and the test can identify how anxiety may affect these capacities.
4.4. Monitoring the Impact of Anxiety on affect: The test measures emotional control for children, a crucial aspect of executive functions. Anxiety can impact emotional control, and the test provides a window to evaluate this influence.
4.5. By employing the Rorschach Inkblot Test, researchers and psychologists can acquire a more profound comprehension of how anxiety impacts executive functions in children. It allows for a comprehensive assessment of their organizational, planning, adaptability, and attentional capacities, enabling the identification of specific needs and interventions to enhance these functions.

5. Method

2.1. Participants

The initial research sample comprised 50 children (25 boys, 25 girls) from Al-Salam Elementary School, their ages ranging between 11 and 12 years. The purpose of this sample was to verify the psychometric properties of the research instrument. The primary research sample consisted of 285 children (132 boys, and 153 girls) were recruited from the fifth and sixth grade from Elementary schools (Salah Al-Din Elementary, El-Zhor, and El-Aml) of El-Kharga city, The New Valley Governorate, Egypt. Their ages range from 11 to 12 years (Mage= 11.61 years; SD = .28). Based on the scores of the primary sample on the State-trait anxiety inventory and using a random method, 9 children (4 boys, 5 girls) were selected as a group experiencing trait anxiety (anxious children), while 11 children (5 boys, 6 girls) were selected as a group not experiencing trait anxiety (normal children). The two groups were matched in terms of age and gender.

2.2. Measures

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

The trait version of the State-Trait Anxiety Inventory (STAI-t; Spielberger et al., 1983, Arbian version, adapted by El-Behary, 2005) 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 (610) male and female students in primary schools, and the reliability coefficient for the trait anxiety scale was (0.47) for males, (0.50) for females. The Cronbach's alpha for the trait anxiety scale was (0.74). The split-half method was used, and the reliability coefficient of the trait anxiety test was (0.77) for males and (0.83) for females. To calculate the validity, concurrent validity with the Taylor Overt Anxiety

Scale was used, and the reliability coefficient was (0.35), which is statistically significant coefficient at (0.01). The validity of the concept and factor analysis were used.

In the current research, the researchers ensured the psychometric properties of the STAI-t after its application to the initial sample of 50 children. The internal consistency coefficients for its items (item-total correlations) ranged between .65 and .84, all of which were statistically significant ($p< .01$). The reliability coefficient for STAI-t, calculated using Cronbach's alpha (.89) and Guttman's method (.88), was also confirmed. The test-retest reliability coefficient (.76) was obtained over a two-week interval. It has been claimed that the STAI-t does not measure solely anxiety, since it includes items related to depression (Endler et al., 1992). Accordingly, the STAI-t shows a high correlation with measures of depression (Spielberger & Reheiser, 2009). So, the validity of STAI-t was verified through concurrent validity with the Children's Depression Scale (translated and standardized by Al-Tayyib, 2015), yielding a validity coefficient of .74, which was statistically significant ($p< .01$).

2.2.2. Rorschach Inkblot Method

The Rorschach Inkblot Method (RIM) consists of 10 tablets displaying inkblots that are presented to the participants in a standardized manner. Many answers with unlimited content are possible. The Exner's Comprehensive System (CS) offers global standardized procedures of administration and scoring (Exner, 2006) and is currently the most widely utilized system (Musewicz et al., 2009). Inter- rater reliability has been found to be good to excellent based on current psychometric standards (Meyer, 2004). Test-retest re- liability data for the Rorschach have been found to be acceptable and it has shown validity in a variety of contexts (Gronnerod, 2003). To summarize the RIM's use in personality assessments is appropriate and justified because it has validity and reliability comparable to other widely used instruments for psychological and cognitive evaluation, and it has been demonstrated to be at least as good as those other instruments. (Meyer, 2004, Slavin-Mulford, 2016, Society for Personality Assessment, 2005). The Rorschach was administered and scored in this research in accordance with Comprehensive System (CS) procedures presented by Exner (2001; 2003).

In accordance with the research objectives, we identified ten pertinent RIM indices that assess basic thinking and information processing, affect, and stress-related cognitive and psychological domains. The indices are described and categorized into three areas in Table 1.

Table 1: RIM Indices and its Interpretation (Exner, 2002, 2003; Ozura & Sega, 2013).

	Fundamental indices, thinking and information processing
R	Number of responses.
L	Responses in pure form reflects reactivity to stimuli
Zf	Organizational activity indicates the participants' capacity to efficiently organize various features of the tablets
	Stress and coping with stress
CDI	Coping Deficits Index in higher values suggests that participants struggle to manage stress particularly in the social domain.
Es	Experienced Stimulation is an indicator of internal burden and reveals feelings of anxiety, powerlessness, disarray, and external influences (needs and urges). It is a composite score of (*FM* +*m* +all *C'* +all *T* +all *Y* +all *V*). *(FM)* refers to animal movement, *(m)* refers to use of inanimate movement, *(C')* indicates achromatic color, *(Y)* refers to diffuse Shading, *(T)* indicates Texture, and *(V)* indicates Vista.
	Affect and self-perception
C%	Pure color responses reflect emotional control.
Afr	Affective coefficient reflects emotional reactivity and is determined by dividing the total number of responses to the final three cards, by the number of responses to the first seven cards, which are mostly achromatic cards.
DEPI	Depression index is a measure of mood disorders; higher scores reflect mood swings, feelings of frustration, and cognitive pessimism.
(3r+(2))	Egocentricity index and self-esteem are related. It reveals how much a person is focused on themselves and how confident they feel about themselves.
MO%	MOR is a symbol used for any response in which an object is identified as dead, destroyed, damaged, injured, or characterized by overtly dysphoric feeling. The percentage of morbid responses suggests the risk of depression and despair and reflects a negative self-image.

The capacity for thinking and information processing reflects the function of flexibility of thinking (Meyer et al., 2011). The capacity for coping with stress reflects the function of planning, decision making and problem solving (Weiner, 2003). The capacity for Affect and self-perception reflects emotional control (Exner, 2003).

6. Results

The Mann Whitney test was performed between the anxious children and normal children for each and every relevant Rorschach variable. Group means and standard deviations for each Rorschach variable, as well as effect size (d) using pooled standard deviation weighted for n was computed for each group are presented in Table 2.

Table 2: Testing Differences between Anxious and Normal Children in RIM Variables.

	Anxious children (n= 9)		**Normal children (n= 11)**		**Testing differences**	
	M	SD	M	SD	Mann W.	d
Basic indices, thinking and information processing						
R	16.33	1.73	18.30	1.22	20*	.70
L	1.47	.35	1.03	.42	17.5*	.60
Zf	8.02	1.60	10.17	1.82	17.5*	.66
Stress and coping with stress						
CDI	2.18	0.18	1.67	.41	11.5**	.70
Es	2.13	1.48	4.17	2.05	18*	.60
Affect and self-perception						
C%	3.78	.85	4.77	.83	22*	.62
Afr	.55	.18	.84	.22	13**	.78
DEPI	2.56	.50	1.69	.77	16.5*	.72
(3r + (2)/R)	.19	0.09	.36	.10	13**	.91
MOR%	1.01	.29	.66	.39	23*	.54

Note: M= Mean, SD= Stander Division, W.= Mann–Whitney Test, * P < .05, ** P < .01, and D= Effect Size Utilizing Pooled Standard Deviation, Weighted for N D >.8 = Large Effect Size, D>.5 =Medium Effect Size, D >.2 = Small Effect Size (Cohen, 1988).

As observed, the anxious group scored significantly lower on a variable of (R) and (Zf) related to thinking and information processing than the normal group. Anxious children attained scores higher than the normal children in the CDI and lower in es variables related to Stress and coping with stress than the normal children. In addition, Anxious children scored higher in DEPI and MOR% and lower in Afr and (3r + (2)/R) than the normal children with both effect sizes in the large range (.78, 91) respectively.

7. Discussion

The current research focused on EF in anxious children. For personality assessment, we utilized a performance-based approach—the RIM assessed by CS—instead of self-report measures. The results of this research indicated that anxious children differ significantly from normal children on several Rorschach variables. Anxious children gave statistically significantly less responses (R) than normal children. Low response rate indicates depression, cognitive

impairment, defensive response style and dissatisfaction (Exner, 2002). The defensive response style is expected as Lambda which is frequently used as an expression of defensiveness (Weiner, 2003) was higher in anxious children. Lambda also suggests a greater need to reduce situations to more easily managed levels and possibly an effort to preserve finite psychological resources. As a result, anxious children differ from normal children in the function of flexibility of thinking which is reflected through their information processing. Their responses were less detailed and complex and their perception was more traditional and less distinct or innovative. The inability to perceive a stimulus from various perspectives is another sign of low cognitive flexibility (Meyer et al., 2011).

Anxious children also differ from normal children in the organization activity which is seen in Zf. Organizational Activity refers to the amount of effort applied, and degree of success achieved by the subject in organizing the stimuli presented by the cards. Exner (1974) has incorporated Beck's system of weighted Z scores as a measure of organizational activity. If a response has form demand it is assigned a numerical value based on the location of and relationship between perceived objects. Children with anxiety scored significantly lower on this variable meaning that they have dysfunction in the executive function of organization.

Anxious children also differ from normal children in the function of planning, decision making and problem solving which is reflected through the capacity for coping with stress (Weiner, 2003). Anxious children attained scores higher than the normal children in the CDI. Their ability to organize their inner experiences and make emotions available is limited. The CDI can be used to detect deficiencies in social skills as well as some features of depression (Exner, 1993).

The anxious group also had higher level of experienced distress (es) which reflects the level of disorganization and invasive uncontrolled thought processes (Groth-Marnat, 2003) and which is a composite score of (FM+m+all C'+all T+all Y+all V). FM represents intrusive ideation that arises from unfulfilled basic needs like love, safety, protection, and respect (Exner, 1993). Inanimate movement *(m)* is used for responses including the motion of inorganic objects and is interpreted as mental diversion or agitation associated with stress (Mihura etal.,2013; Exner,2003). Children's anxiety is probably more closely linked to a need for external warmth, as evidenced by their increased use of (T). This is consistent with the findings of Slavin-Mulford et al. (2016) which found that patients with generalized anxiety disorder scored significantly higher on measures of cognitive agitation and a need or desire for external relief.

Next, we looked at the capacity for Affect and self-perception which represents the function of emotional control (Exner, 2003). Anxious children produce fewer sum C responses and a lower affective ratio than normal children. They showed a propensity to withdraw from their emotions and a decreased willingness to process emotional stimulation, both of which can result in avoiding emotionally charged situations. Withdrawal from society and emotions may result from this profile. This leads to negative consequences and sensations associated with emotional pain and suffering as well as an overcontrol of impulse expression through withdrawal from emotion-arousing stimuli.

These results seem to be prompted by the emotional deficiency that characterizes anxious individuals. The current results is consistent with the results of Suveg and Zeman (2004) which has also found that children who experience anxiety also tend to experience their emotions more intensely, employ less adaptive emotion regulation techniques, and believe they are less capable of managing emotional situations than their peers. This finding can be interpreted

according to the Emotion Dysregulation Model of Anxiety (EDMA), which focuses on the effect of both temperamental (behavioral inhibition) and contextual (family emotional environment) factors on anxiety levels (Suveg et al., 2010).

High temperamental reactivity may make emotions difficult to distinguish from one another, contributing to poor awareness of emotional experience (Baker et al., 2004). Insufficient awareness of emotional experience is a necessary component of competent emotional functioning, and without it, regulation attempts are likely to be challenging and ineffective (Halberstadt et al., 2001). Furthermore, high reactivity may limit one's capacity to access and produce cognitive methods for adaptively modulating the emotional experience. So, behavioral inhibition is a contributing factor to emotion dysregulation, which in turn affects anxiety symptoms because of the incapacity to control the emotionally-arousing experience (Suveg et al., 2010).

.In accordance with the above perspective, Dunsmore and Halberstadt (1997, 53) suggest that the "overall frequency, intensity, and duration of positive and negative emotional expressiveness in the family is important in the child's formation of schemas about emotionality, about expressiveness, and about the world." Children raised in families with low levels of expressiveness are prone to form schemas that believe expressing emotions is inappropriate in general. When low expressiveness results in the suppression of emotional experiences, it can become very problematic. Excessive suppression of emotional experience may exacerbate regulation problems by raising sympathetic arousal and subjective distress (Suveg et al., 2010).

Furthermore, anxious children produced significantly lower Egocentricity index scores (3r + (2)/R) and higher Mor responses when compared to the normal children. This data indicate that anxious children tend to make negative judgments about themselves and others, their thinking is pessimistic. According to Weiner (2003), Mor responses usually indicate a lack of self-esteem and a feeling of one's body as defective. These data support the Depression index that indicates emotional difficulties which is higher in anxious children than in normal children.

These findings indicate that anxious children suffer from a disruption in their EF especially in the function of emotion regulation which compromises clarity of thought. This is in line with previous studies showing a link between poor executive functioning and elevated anxiety levels (Castaneda et al., 2008; Ursache & Raver, 2014; Visu-Petra et al., 2013).

Overall, these findings can be interpreted according to the monitoring process model formulated by Miller et al., 1995. High monitors are more likely to quickly identify and scan for internal and external threat signs. This process would encourage intrusive ideation as seen from higher level of experienced stimulation (es) in anxious children. In addition, high monitors would tend to understand and interpret neutral or confusing information in a threatening way, which would result in exaggerated assessments of one's own risk. An increased perception of risk and a high frequency of intrusive ideation would lead to heightened anxiety and distress that in various anxiety disorders cognitive abnormalities occur that closely resemble monitoring (Muris et al., 2000). This result is consistent with study by Hoffner (1993), which indicated that children may also use monitoring coping mechanisms. These results also corroborate Miller's (1992) hypothesis that a variety of anxiety symptoms could be linked to a monitoring coping style.

To conclude, the Rorschach Test was a reliable tool that provided data on a variety of facets of the EF deficiency in children with anxiety. We can also conclude that their deficit resulted

from their higher emotion dysregulation which is an important factor of psychopathology that should be taken into account. Additionally, as the emotional deficits influence anxiety levels, so encouraging emotional expression within the family likely provides opportunities for children and youth to discuss emotional experiences and acquire adaptive techniques for regulating their emotions. More specifically, our findings suggest that fostering a sense of mastery over complicated and challenging emotions may be especially beneficial for treating individuals with anxiety. Helping anxious people believe they can manage their unpleasant emotions in the future, in particular, is likely to increase their positive perceptions of their problem-solving skills. Teaching them stress management skills, such as social skills training, relaxation techniques, and behavioral activation would be more beneficial strategies.

8. Limitations

Replication of the present findings in anxiety disordered samples is definitely needed for many reasons. First, it is important to note that the current research relied on a sample of nonpreferred children, so it is important to note that the results may not fully represent all the anxious children in the local population. Second, the data collected is limited to children studying in primary 5 and 6, aged between 11 and 12. So, the findings cannot be generalized to other age groups. Additionally, the generalizability of the results was further restricted by the fact that other comorbidities, such as ADHD, depression, or conduct disorder, were not distinguished among the participants.

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